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Notes and Comments

The Institute of Chemistry

PROFESSOR JOCELYN F. THORPE is to be congratulated upon his re-election as president of the Institute of Chemistry, numerically the largest, though not the oldest, organisation of chemists in the country, whose fifty-sixth annual meeting in London on March 1 bore testimony to the value of the Institute in furthering the interests of the chemical profession. The membership of the Institute continues to grow year by year, and its influence is felt not only within the ranks of chemistry but in a dozen or more kindred organisations in which the Institute is officially represented by specially chosen members. During the past year there has been an increasing recognition of the work done by the local sections in various parts of the country, and, as we reported in THE CHEMICAL AGE at the time, a conference of all the local hon. secretaries paved the way for still more effective activity.

The annual report sets out in detail the authors and subjects of over seventy of the more important papers presented to the local sections during the past twelve months. There are seventeen sections at home and overseas, ranging in membership from 29 in Malaya to 2,343 in the London and South-Eastern Counties section. We are glad to note that Professor Thorpe made special reference to the local sections in his review of the year's progress, for it is to the loyalty of those members in the more remote areas that the Institute owes much of its real influence.

Safety in Chemical Works

THERE is much in Mr. Dixon's paper published in THE CHEMICAL AGE, March 3, that will repay careful study. Why, for example (to quote Mr. Dixon) were run-off cocks, etc., often placed in "such positions that their normal operation definitely called for considerable agility on the part of the operator to avoid injury." We have seen valves placed so high and in such inaccessible positions that a strong nerve was needed to reach them under good conditions, and in frosty weather or at night the attempt was almost suicidal. We recollect a bunker to which the means of access was a 3 to 4 ft. jump across an intervening gap some 70 feet above ground level! All these faults arise from the same cause. The same cause made the use of even laboratory apparatus difficult. The designer had no practical experience. Most draughtsmen of the period, and many even to-day, had never so much as seen the erected or constructed work. The drawing was put on paper, and the draughtsman had finished with it; the ordering engineer and the erector did the rest. The erector, having built the plant, went on to the next job, leaving someone else to set it going. It was small wonder that the draughtsman was unable to visualise the risks to which he was committing the operators. If some enterprising firm had had the courage to spend a few pounds in sending their draughtsmen into the works to see—and do—for themselves, they would have earned a reputation for good design which would have been worth much. It is now so unusual for works of any size to employ a resident draughtsman who is constantly in and around the works, that these faults in design are largely avoided.

"To-day," we read, "the most striking features about a chemical plant are its spaciousness and lighting." That is symbolic of the new outlook of the chemical industries. It is recognised that good layout saves money, that the worker whose days are spent in tidy and spacious surroundings will be more likely to work skillfully and economically than when the whole concern resembles nothing so much as a scrap-heap.

The Science of Lighting

LIGHTING has become a science of its own; the street lighting engineer is well known, but is it always realised that the best and most economical way to light a works is not to let the draughtsman or works engineer arrange lights about the works in accordance with his fancy, but to ask the local lighting engineer, whether gas or electricity, to take the work in hand, paying due consideration not only to intensity of light but to avoidance of glare? To those who have not seen it, we would recommend a visit to the boiler room at the new Battersea Power Station, London.

When all has been done by the designer and senior operating staff, much must depend on the workers. The factors that contribute to safety are so many that some may be forgotten. The safety handbooks and safety committees to which Mr. Dixon calls attention are of the utmost value in chemical works; it is inconceivable that the present excellent record of the chemical industry as regards accidents could have been achieved without the operation of all the factors and the co-operation of all. It is outstandingly an example of what may be achieved when directors, staff and workmen combine in the promotion of a worthy object. The safety of the workers is more than a humane desideratum. It

is to the shareholders an investment; there is nothing which sooner saps the confidence of employees and leads to inefficient results and to material and financial disaster than a series of accidents.

Transport and the Chemical Industry

THE chemical industry is interested in transport in many ways. It provides a number of materials used in the construction of cars and lorries. More directly it is interested in supplying fuel for internal combustion engines. Although this may concern only a few works nearly every chemical works in the country uses the internal combustion engine for transporting goods or raw materials. To some works the cost of transportation is an important item. It was shown some time ago, for example, that whether sulphate of ammonia manufacture on a large gas undertaking was profitable or not depended at that time upon the cost of conveying the liquor from the several works to the ammonia factory. By modifying the methods used in recovering the ammonia from the gas so that the ammonia liquor was more concentrated, a great difference was made to the economies of the process. There was, of course, another way of considering the problem. The transport costs might have been reduced by decreasing the running costs of the vehicle; this is the method which must appeal to the majority of our readers, since most of them cannot increase the concentration of the material handled.

The chemical industry cannot fail to be interested in any new development in this direction. On the one hand, existing fuels supplied by oil companies and others may lose their markets; new fuels, such as those resulting from hydrogenation, may take their place; finally, the cost of transport may be so reduced as to make economical practices that have hitherto met with no success. There can be no doubt that coal gas is making a real bid for the petrol market.

Gas versus Diesel Oil

THE extent to which the adoption of gas will affect petrol consumption must have its repercussions on oil-from-coal projects, whether carbonisation or hydrogenation. It can be shown that, when compared with petrol, gas will halve the fuel bill even when supplied at prices that leave an ample margin for profit to the gas producer. We have already referred in recent weeks to the production of special cylinders, and to the success with which this problem has been overcome. In the course of his annual review of the activities of his company the chairman of the Newcastle Gas Co. has now given particulars of a regular motor-bus service in his area in which all difficulties regarding the use of gas have been overcome. One of the defects of gas has been that the mileage per charge of gas has been limited to 70-80 miles, but as the result of new research an engine has been designed specially for use with gas in which this mileage has been materially increased.

Whilst paying every tribute to the zeal with which our gas friends have pursued the vision of a new market for their product, we are bound to confess that a gas-driven lorry is not the cheapest in fuel costs. Those interested in oil-from-coal schemes will be wise to pin their faith to the Diesel-engined lorry. We made some inquiries at the British Industries Fair and failed to find any evidence that gas as a fuel can approach Diesel oil, with its fuel costs in the neighbourhood of 0.05 pence per ton-mile. With the virtual disappearance of the steam wagon, killed by taxation, the oil-driven lorry is coming into its own; at the present time there is a wholesale displacement of steam wagons by Diesel-engined wagons and until some fundamental change in the oil or gas situation occurs, we doubt whether gas can be seriously considered, or whether any comprehensive gas scheme of filling stations will be justifiable.

The British Industries Fair

THE improvement in the textile industry has had its inevitable reflex action upon dyestuffs and a welcome revival appears to be felt, according to the impression which we gained at the British Industries Fair. This is the more encouraging since it is pre-eminently an industry won back from the foreigner. Although this country was the home of the modern chemical dye, no less than 80 per cent. of the dyestuff requirements were imported twenty years ago. To-day we are not only self-supporting, but have a healthy export trade. Statistics show that the export of dyes is increasing even during the lean years that have just passed, whilst imports, no doubt as the result of the dyestuffs import policy, have fallen heavily. The dyestuffs industry is so closely related to explosives that we feel particular pleasure in this achievement. Whether we are politicians or not, it must be confessed that much of what has been gained has been due to political action which has at last given our chemists and engineers a chance to see what they can do without having their best efforts immediately nullified by Government action abroad. Much of the good work that has been done each year is due to research and it is pleasing to learn that I.C.I. spends half a million pounds annually upon technical research and charges it against revenue; it would be interesting to hear what other large chemical firms are spending and to know that the industry as a whole has the same appreciation of the value and necessity for research as has its principal unit.

The special grade of titanium pigment featured on the stand of the Association of British Chemical Manufacturers appears to be another meritorious achievement, particularly in its resistance to corrosion, light and heat. Those who have had the troublesome problem of advising on the painting of laboratory walls will welcome the new pigment with its peculiar warmth! The titanium industry is one to which our manufacturers might with advantage pay attention since we use only 5,000 tons in this country as pigments as compared with 75,000 tons in the United States. It would be impossible, even if it were desirable, to review in these columns all the interesting products that were to be seen at the Fair. We are, however, left with the reflection that the growth of the chemical section is a proof of what can be done with efficient organisation, such as that provided by the Association of British Chemical Manufatcurers. Continuous application of scientific research, the provision of new plant, and the employment of new methods have enabled the chemical industry to strengthen its position enormously during the past fifteen years; it is particularly gratifying to have seen on the stands articles formerly imported which are now made in this country and exported.

Annual Meeting of the Institute of Chemistry

Professor J. F. Thorpe Re-Elected President

THE report of the Council presented at the fifty-sixth annual meeting of the Institute of Chemistry in London on March 1 stated that during the year fifty Fellows had been elected, of whom 45 were formerly associates, and 261 associates, of which 91 were registered students. Two associates had been re-elected, 144 new students had been admitted and one re-admitted, and the Council recorded with regret the death of 27 Fellows and 15 associates. After deducting resignations, etc., the register now contained the names of 1,993 Fellows, 4,149 associates (in all 6,142 members) and of 715 registered students, showing a net increase of 88 members and a decrease of 68 students.

The annual subscriptions showed an increase notwithstanding the circumstance that a marked increase in 1932 above that in 1931 was mainly due to the collection of arrears. The present statement, moreover, does not include subscriptions which have been paid, towards the end of the year, to the accounts of the Institute in Australia and New Zealand—particulars of which are not yet to hand—arrangements having been made whereby members in the Commonwealth and the Dominion, respectively, may pay their subscriptions in local currency until the rates of exchange improve. Reduced receipts from dividends and interest are mainly attributable to the conversion of War Loan and the low bank interest on deposits during 1933.

Two Legacies

The Institute received legacies under the wills of Mr. J. Gordon Gordon and Mr. J. E. Legg, which, together with entrance fees and life compositions, have been invested.

Administrative expenses had been reduced in recent years, and further reduction in expenditure could only be effected by restricting the activities of the Institute.

After the passing of the Pharmacy and Poisons Act, the Council considered the question of proceeding with the petition for a supplemental charter, to secure the title "Chartered Chemist" for the exclusive use of Fellows and Associates of the Institute, but decided to postpone the matter pending the proceedings of the conference of representatives of various chemical bodies on means for promoting closer co-operation among chemical societies.

Examinations were held in April and September, 1933, and in January, 1934. The pass lists were as follows, the total numbers of candidates being given in parenthesis: Associateship: General chemistry (85), 48. Fellowship: Inorganic chemistry (2), 2; organic chemistry (3), 3; biochemistry (3), 2; the chemistry (including microscopy) of food and drugs and of water (14), 6; agricultural chemistry (2), 2; industrial chemistry (2), 2. Special examination (1), 1. Total examined 112; total passed 66.

The Board of Examiners

Thanks are accorded to the board of examiners, to the examiners in special subjects, and also to Fellows who gave special facilities for examinations in their laboratories, and to the assessors appointed from time to time to examine the papers submitted by candidates for the Fellowship. The Council is indebted to the University of Manchester, the Royal Technical College, Glasgow, the Central Technical College, Birmingham, the Royal School of Mines, London, University College, London, the University of Reading and the Anglo-Persian Oil Co. for the use of laboratories and for facilities afforded in connection with the examinations. The Council again acknowledges the valuable help of the Indian Advisory Committee and its hon. secretary, Dr. Gilbert J. Fowler.

The Meldola Medal (the gift of the Society of Maccabaeans) for 1933 has been awarded to Maurice Stacey, B.Sc., Ph.D. (Birm.), now holding a Beit Medical Fellowship at the London School of Tropical Medicine and at the University of Birmingham. The Sir Edward Frankland Medal and Prize for 1933 have been awarded to Walter Lee, registered student, working with Mr. C. H. Manley, Fellow, and at the College of Technology, Leeds, for his essay on "The Chemical Education of Part-time Students."

The reports of the assessors on the examinations for National Certificates for England and Wales and also for Scotland show that the number of candidates presenting themselves for these examinations is increasing. The scheme is exercising a marked effect on the training in chemistry provided in the technical institutions. Dr. A. Jamieson Walker, on his retirement from his appointment as one of H.M. Inspectors of Technical Schools, has agreed to remain a member of the Joint Committee of the Board of Education and the Institute, as one of the representatives of the Institute.

Mrs. Janet W. Matthews, associate, has been appointed the Third Pedlar Research Scholar, and is enaged at the Imperial College of Science and Technology on the development of inorganic microchemical analysis with special reference to gravimetric work requiring separations.

Publication of Lectures

The scheme of lectures illustrating the trend of recent developments in the main branches of chemistry was continued by the delivery, in May, by Professor Gilbert T. Morgan, of three lectures embodying "A Survey of Modern Inorganic Chemistry." These, in addition to the following lectures, have been published as separate monographs:—"Chemistry and Life" (Fourth S. M. Gluckstein Memorial Lecture), by Sir Frederick Gowland Hopkins, P.R.S.; "Science and the Community," given before the Manchester and District Section, in November, 1932, by Professor Alexander Findlay; "The Chemist in the Far East," given before the London Section in February, by Mr. Alexander Marcan; "The Detection and Determination of Small Amounts of Substances by Colorimetric Methods," given before the Leeds Area Section, in February, by Mr. Norman Strafford; "Joseph Priestley: 1733-1804," given before the Institute, in March, on the occasion of the celebration of the bi-centenary of the birth of Priestley, by Professor R. M. Caven, member of Council; "Alchemists in Art and Literature," which had been given before local sections of the Institute and elsewhere since 1925, by the registrar and secretary of the Institute; "Beer" (Sixteenth Streatfeild Memorial Lecture), given by Mr. H. F. E. Hulton, in November; "Electrometric Methods in Physical and Analytical Chemistry," given by Dr. Samuel Glasstone, at Leeds, in November; "The Chemist as a Directing Force in Industry" (Fifth Gluckstein Memorial Lecture), delivered by Dr. Herbert Levinstein, in December.

Further lectures on modern laboratory technique are being arranged, under the advice of Professor H. V. A. Briscoe, to be given in April or May of this year.

The Public Appointments Committee

The Departmental Committee on Food Law, having resumed its work, invited the Council of the Institute to consider the revision of the memorandum forwarded to the Departmental Committee in 1931, although the terms of reference to the Departmental Committee had been altered so as to exclude practically all matters dealt with in the original memorandum.

The Public Appointments Committee felt, however, that it would be difficult to make any change in the law relating to food without considering changes in the methods of its administration. The committee, therefore, revised the memorandum, and the Council directed that copies be forwarded, with a covering letter, to the Departmental Committee, supporting a memorandum submitted by the Society of Public Analysts, and offering to send representatives to give evidence if the Departmental Committee thought that the views of the Institute might be useful in connection with any changes in the food law. The Council also suggested that a permanent committee, on which public analysts and other food chemists should be represented, should be estab-

lished to formulate standards and limits of purity, the need for which might arise in any emergency, and also to ensure that anomalies, such as at present exist in the food regulations, might be avoided in future. The Public Appointments Committee has also dealt with questions affecting the interests of chemists in the Colonial and Indian Services, which have received the attention of the authorities concerned. Representations have also been made to the proper authorities regarding complaints against the attempts of certain rate-aided institutions to undertake professional chemical consulting and analytical practice.

Profession Not Overcrowded

Professor JOCELYN THORPE, president, in moving the adoption of the report, said that the number of members known to be disengaged was not more than 3 per cent., so that the profession did not appear to be seriously overcrowded. There were some who advocated that means should be taken to restrict entrance to the professions generally, but he felt that such a step would be difficult to accomplish, and that what was really required was the insistence on a high standard of entrance examinations to the universities and colleges in order to eliminate those who were not likely to make really good professional material. Professor Thorpe referred to the friendly co-operation of the Institute with other societies, and also with the British Standards Institution, the Chemical Division of which was now in full operation.

The Institute's financial affairs were in a sound condition, and its benevolent fund had a useful balance in hand, although recently the appeals for help from relatives and dependents of former members and from present members who were without appointments or had otherwise met with misfortune, had lately increased. The Legal and Parliamentary Committee, under the chairmanship of Sir Christopher Clayton, had rendered useful assistance in matters of public importance, in which the profession was concerned. The new Pharmacy and Poisons Act had placed beyond doubt the right of those who practised chemistry, as well as those who practised pharmacy, to use the only title by which they they had been known throughout the ages and in every country in the world, although by custom, in this country, it had become more and more used to refer to pharmacy. The Institute, moreover, had been accorded the privilege of appointing representatives on the Poisons Board which had been constituted under the provisions of this Act, and Dr. Gerald Roche Lynch, one of the examiners of the Institute, had kindly consented to serve in that capacity.

The Local Sections

The president next referred to the activities of the local sections of the Institute, both at home and in overseas Dominions, which continued to strengthen the bond of mutual interest among the chemists engaged in all spheres of work. The examinations and qualifications of the Institute were maintained at the highest possible standard, and its diplomas were fully recognised for many important appointments. He urged that associates should be encouraged to proceed to the Fellowship, because he felt sure that those who set themselves seriously to prepare for the Fellowship examination, besides achieving the higher grade of membership, which carried with it enhanced prestige, would find the necessary preparation of great value to them in their professional work.

The examinations for National Certificates in Chemistry, conducted jointly by the Institute and the Board of Education and the Scottish Education Department respectively, were having a beneficial effect on the training in science afforded in technical institutions throughout the country. Lately, the Council had discussed the place of chemistry in general education. It seemed that it was held in some places that chemistry was too difficult a subject for boys under 16, and that physics and biology should be given the preference as school subjects. There was a division of opinion on the question, and the Council proposed to publish the discussion and to invite the members to express their views thereon. In this connection the president referred to his own experience in which the school notebooks of a student showed that while at school he had been allowed to work alone in a laboratory with very dangerous materials, although, fortunately, without any serious result.

The officers and council for the ensuing year were declared elected, Professor Thorpe being re-elected president. Other appointments were:—Vice-presidents—W. J. A. Butterfield, Sir George C. Clayton, A. E. Dunstan, F. G. Edmed, H. H. Hodgson and W. H. Roberts. Hon. treasurer—P. H. Kirkaldy. Members of Council—F. S. Aumonier, C. O. Bannister, J. C. A. Brierley, R. Bruce, Dr. T. Callan, R. M. Caven, Dr. F. D. Chattaway, Dr. H. E. Cox, H. W. Cremer, Dr. C. Dorée, G. D. Elkington, G. D. Elsdon, J. Evans, Dr. A. E. Everest, L. Eynon, Dr. P. F. Gordon, Dr. R. H. Greaves, W. R. Hardwick, G. E. Holden, Dr. R. H. Hopkins, E. B. Hughes, J. R. Johnson, Dr. J. G. King, Dr. L. H. Lampitt, Dr. H. Levinstein, Dr. A. G. G. Leonard, J. H. Lester, Dr. Dorothy Jordan Lloyd, Dr. C. Ainsworth Mitchell, T. F. E. Rhead, W. Rintoul, Dr. R. Robinson, Dr. S. Smiles, F. Southerden, Dr. E. Vanstone, Dr. W. Wardlaw, Dr. H. B. Watson, E. J. Way and A. W. M. Wintle.

An I.C.I. Solicitor Sentenced

Pleads Guilty to Fraud

SENTENCE of eighteen months' imprisonment was passed by Mr. Justice Branson at the Central Criminal Court on March 1, on Arthur Ramsay Patey, 28, solicitor, when he pleaded guilty to charges of fraudulent conversion, falsification of accounts, and misappropriation of large sums of money belonging to Imperial Chemical Industries, Ltd., Millbank, Westminster.

Mr. G. D. Roberts, prosecuting, said that Imperial Chemical Industries, Ltd., had a private legal department and private solicitors. Defendant was on the staff of the legal department, having obtained that situation in 1929, when he was admitted a solicitor, his commencing salary being £300 per annum, and at the time of the discovery of the offences his salary was £420 a year. The defendant had been perfectly frank with regard to his defalcations, and he had supplied a document signed by himself in which he stated that he had misappropriated, or fraudulently obtained from his employers, a sum of, at the most, £7,585. The methods employed by the defendant were that when petty cash vouchers were made out the defendant would get them signed by the heads of the legal department, saying that the money was wanted to pay stamp duty on conveyances. Defendant, being a solicitor, was trusted, and his word was entirely relied upon.

Giving an instance of one case, counsel said that a voucher for £11 was altered to £44, and the cashier had no hesitation in paying over the money because the voucher was signed by a senior member of the department. In other cases the defendant had used moneys which should have been paid out for specific purposes. It was quite clear where the money had gone, and from the defendant's own account it had been used on betting on dogs and horses.

The prosecution, said counsel, felt they had no alternative but to bring the charges as an example to others, but having prosecuted they did not desire to be in any way vindictive, or press the case unduly

Mr. Walter Frampton, defending, said it was a tragic case. The defendant was educated at one of the well-known public schools. He had the misfortune to be a trustee in a small settlement for a distant cousin. At the beginning of last year that lady was anxious to raise some money under the settlement and Patey became infatuated with her and was unsuccessful in obtaining the money required, but he became associated with a wide circle of theatrical people and was spending money beyond his means. In June Patey was advised to take a sleeping partnership in a bookmaker's business. From that moment he was pressed by the people conducting that business to pay losses, and Patey was now a ruined man. It was not a case of a solicitor who had been in practice for years obtaining the confidence of his clients and then defrauding them.

Mr. Justice Branson remarked that if it had been an ordinary case of a solicitor embezzling clients' money he would have sentenced Patey to a long term of penal servitude, but he would take a different view in this case. "I have very little doubt that the heaviest part of your punishment," said the Judge, "is the disgrace you brought upon your family."

Recent Progress in Metallurgy

Annual General Meeting of the Institute of Metals

THE twenty-sixth annual general meeting of the Institute of Metals was held in London on March 7 and 8, when the retiring president, Sir Henry Fowler, D.Sc., inducted the incoming president, Dr. Harold Moore, into the chair.

Presenting the report of the Council for the year ended December 31, 1933, the secretary said the period was specially notable for the celebration of the twenty-fifth anniversary of the Institute's formation and for the setting up of improved methods of publication. The Institute ended another year of the long-continued industrial depression with a slight reduction in its membership and financial resources, but in spite of the difficulties encountered, it is felt that the usefulness of the Institute to its members has been increased. This has been made possible by the encouraging and continued support given by members financially, in committee, and in other ways, and by the unwearying efforts of the staff.

On December 31, 1933, the names of 122 original members were included in the total of 2,038 ordinary members. On December 31, 1908—the end of the Institute's first year—the original members numbered 355. During 1933, 133 members and students were elected, compared with 120 in 1932, and 205 in 1931.

The past year also saw considerable activity in connection with the Institute's publications. In response to suggestions made by members the Council arranged for advance copies of papers to be printed in the Monthly Journal. It is hoped by the Council that the new method of publication will be generally appreciated by the members, and will result in better discussions, since in many cases members will receive papers some months earlier than would have been possible under the old system.

Election of Officers

The secretary announced that the Council for the year 1934 had been elected as follows:—President, Dr. H. Moore. Past-presidents: Sir John Dewrance, Sir Henry Fowler, Dr. W. Rosenhain, Mr. Richard Seligman, Mr. Leonard Sumner, Professor T. Turner. Vice-presidents: Mr. W. R. Barclay, Dr. C. H. Desch, Mr. A. G. C. Gwyer, Professor D. Hanson, Mr. H. C. Lancaster, Mr. E. L. Morcom. Hon. treasurer: Mr. John Fry. Council: Professor J. H. Andrew, Mr. S. L. Archbutt, Engineer-Vice-Admiral H. A. Brown, Dr. H. W. Brownsdon, Engineer Vice-Admiral Sir Robert Dixon, Mr. Maurice S. Gibb, Mr. K. Gray, Mr. H. H. A. Greer, Dr. J. L. Haughton, Professor R. S. Hutton, Mr. Wesley Lambert, Mr. A. H. Mundey, Mr. A. J. G. Smout, Mr. James Steven, Mr. F. Tomlinson and Mr. H. B. Weeks.

A paper on minimum dimensions of test samples for Brinell and diamond pyramid hardness tests was presented by G. A. Hankins, D.Sc., A.R.C.S., and C. W. Aldous, B.Sc., A.C.G.I. (National Physical Laboratory). This investigation was carried out to determine the effect of variations in the dimensions of test samples on the results of Brinell and diamond pyramid hardness tests, and to enable minimum dimensions of test samples to be suggested. The metals investigated include copper, brass, aluminium and steel. It is concluded that a width of test specimen of $4\frac{1}{2}$ times the diameter of the impression is satisfactory for accurate Brinell tests on all the materials examined. In regard to the thickness of samples for Brinell tests, the limiting value of the ratio of thickness of test sample to depth of impression for accurate results appears to be a characteristic of the test material; a value of the ratio of 6 is required for mild steel, about 15 for copper, and more than 20 for spring steel.

Influence of Gases

The influence of gases in an 8 per cent. copper-aluminium alloy on normal and inverse segregation was dealt with in a note by I. G. Slater, M.Sc., Ph.D. (The University, Birmingham), who said that in a sand-cast ingot 3 in. in diameter by 3 in., segregation was found to be inverse with very gassy melts but to be normal with degassed melts.

The diffusion of zinc and iron at temperatures below the melting point of zinc was described by Gilbert Rigg (Melbourne, Australia). The author pointed out that when clean rolled zinc sheet is heated in close contact with clean iron diffusion commences at below 300° C. and is fairly rapid at above 380° C. It proceeds by the formation of cones of diffusion products which spread out from isolated points where the contact between the metals is most perfect, and gradually penetrates into the zinc and across its surface. The progress of the diffusion is governed to a large extent by the nature and smoothness of the iron surface, and does not seem to be dependent on the vapour pressure of the zinc. Two well-defined layers of diffusion products are formed, a thin layer of constant thickness (about 0.08 mm. containing about 17 per cent. iron being next to the iron, and a thicker layer containing 0.11 per cent. iron outside this. On continued heating, the thin layer moves towards the zinc, being continuously converted into the zinc-rich layer; this would seem to indicate that the principal diffusing constituent is the iron. The rate of penetration depends on time and temperature, and is independent of the grade of zinc, but the thickness of the zinc-rich layer is less with electrolytic than with pure zinc.

Fatigue Characteristics

A study of the influence of the intercrystalline boundary on fatigue characteristics was reported by H. J. Gough, D.Sc., Ph.D., F.R.S. (National Physical Laboratory), H. L. Cox and D. G. Sopwith, B.Sc.Tech. It was with the object of studying the process of fatigue in relation to crystalline boundaries that tests were made under alternating torsional stresses on three specimens of aluminium each consisting of two crystals. In one specimen the intercrystalline boundary was mainly transverse to the axis of torsion; in another it was mainly longitudinal through that axis, whilst in the third the boundary had no special form, but the two constituent crystals were in mutual twin orientation. It appears that the presence of intercrystalline boundaries may considerably strengthen the constituent crystals against fatigue; but that the effect of the boundaries on the distribution or even on the amount of slip is very small. It is probable that the major effect of the boundary may lie in some restriction of strain that it imposes.

The viscous properties of extruded eutectic alloys of lead-tin and bismuth-tin were discussed by C. E. Pearson, M.Met. (Armstrong College, Newcastle-upon-Tyne). It was pointed out that the eutectic alloys of lead-tin and bismuth-tin, when in the extruded condition, can be deformed in a viscous manner. Elongations up to 2,000 per cent. have been obtained in tensile tests employing prolonged loading. By the use of an apparatus designed to maintain a constant stress on the test-piece during extension, it has been shown that deformation takes place at a uniform rate which is greatest in freshly extruded rods and decreases with age or on annealing. The viscosity possessed by the alloys is not that of simple liquids, but resembles that shown by some disperse systems in which the viscosity coefficient is a function of the stress causing flow. The locus of viscous flow is found to be at the intercrystalline boundaries. It is particularly pronounced in these extruded alloys owing to the persistence of a very small grain-size after recrystallisation.

Flow in Soft Metals

A note on some formulæ concerning viscous and plastic flow in soft metals was contributed by E. W. Fell, M.Sc., who dealt with a certain type of flow observed in soft metals, eutectics included. The flow of the metal in a prolonged ball-hardness test was compared with the flow in tensile test-pieces under a constant stress per unit area of cross-section.

The castability of ternary alloys was the subject of a notable contribution by Professor A. Portevin (Professeur Suppléant à l'Ecole Centrale des Arts et Manufactures, Paris) and P. Bastien. It was stated that the ability of a molten metal or alloy to fill a mould completely is termed "castability," and can be determined by ascertaining the length of a spiral cast-iron mould filled by the metal under prede-

termined casting conditions. The castability of a pure metal is a linear function of the difference between the pouring temperature Θ and the melting point F; the slopes of the castability (Θ-F) curves vary with the viscosity of the metal. The castability of binary alloys varies with the solidification range and with the mode of crystallisation, being greater when polyhedral crystals separate than when the primary crystals are dendritic. Maximum castability occurs with the eutectic composition and minimum at the limit of solid solubility. The castability of ternary alloys varies inversely with the primary solidification range, and in cases where this is nil (*i.e.*, along the binary eutectic lines in the ternary system), it varies with the secondary solidification range reaching a minimum at compositions corresponding with the transition from two-phase to three-phase fields. These laws were illustrated with reference to several binary antimony alloys and to ternary alloys of lead, tin and bismuth and of iron, carbon and phosphorus.

A paper on alloys of silver and beryllium was presented by H. A. Sloman (National Physical Laboratory), who has redetermined by thermal and micrographic analyses the constitution of the whole range of alloys in the silver-beryllium system. A description was given of new tarnish-resisting silver alloys obtained by the addition to silver and to some "standard" silvers of very small quantities of beryllium.

The constitution of copper-iron-silicon alloys, by Professor D. Hanson, D.Sc. (The University, Birmingham) and E. G. West, Ph.D. (The University, Birmingham), dealt with alloys containing up to 8 per cent. of iron and 8 per cent. of silicon. The solubility of iron in copper was reported to be decreased by the presence of silicon. Over the greater portion of the range of compositions examined, iron exists in the alloys as such, containing only a small amount of silicon and copper in solution; its solubility in the solid state decreases rapidly with fall of temperature and becomes very small below 700° C. Within certain ranges of composition, iron and silicon combine to form another constituent, probably FeSi, which forms a series of alloys with the *a* solid solution. FeSi also appears to form systems of alloys with the alpha, beta, gamma, delta, and epsilon constituents of the copper-silicon series. The shape of the liquidus and solidus curves has been determined and the changes occurring in the system during the process of cooling from the liquid state have been indicated. The constitution of the alloys suggests the possibility of modifying their mechanical properties by heat-treatment.

Transformations in the copper-palladium alloys formed the subject of a paper by R. Taylor, B.Sc. (Downing College, Cambridge) Copper-palladium alloys up to 55 atomic per cent. of palladium were examined by thermal, micrographic and electrical resistance methods, and the determination of the electrical resistance-temperature curves was carried out with a much slower change of temperature than had previously been used. The occurrence of two transformations at 10-30 and 35-50 atomic per cent., respectively, associated with different types of electrical resistance curve, was confirmed.

Dealing with the malleability of nickel and of Monel metal, Owen W. Ellis, M.Sc., (Ontario Research Foundation, Toronto, Canada), discussed the effect of annealing temperature on the hardness of two rods—½ in. and 1 in. in diameter, respectively—of cold-drawn nickel, which were the subject of malleability tests at temperatures varying from 250° to 1,100° C. The paper concluded with a description of experiments: (1) on the effect of annealing normal samples of the 1 in. material on its malleability at 800°, 900° and 1,000° C., and (2) on the malleability of Monel metal.

Dealing with the constitution of the magnesium-rich alloys of magnesium and nickel, John L. Haughton (National Physical Laboratory) and Ronald J. M. Payne, B.Sc. (National Physical Laboratory) reported that magnesium alloys containing up to 50 per cent. nickel has been studied by thermal and microscopic methods. Magnesium forms a eutectic with the compound Mg_2Ni at a temperature of 507° C. and a composition of 23.5 per cent. nickel. The solubility of nickel in solid magnesium is less than 0.1 per cent.

Dr. Harold Moore

New President of the Institute of Metals

DR. HAROLD MOORE, the new president of the Institute of Metals, was born in 1878. He began his metallurgical career as a pupil of the late Dr. J. E. Stead, F.R.S., of Middlesbrough, whose original genius, scientific intuition and transparent sincerity made a profound impression upon him in those early years. In 1899 he joined the staff of the Islip Iron Co., Northamptonshire, as chemist, and obtained experience in blast furnace practice, also seeing something of the mining of Northamptonshire ironstone. In 1901 he became research metallurgist at the Parkhead steel works of William Beardmore and Co., Ltd., where his work in connection with the manufacture and heat-treatment of armour-plate developed his interest in alloy steels. Rapid progress was then being made in the application of nickel-chromium steels for this and other purposes. Later work has shown that some of the methods of heat-treatment then developed empirically must have had the effect of suppressing temper brittleness, a trouble that was not clearly defined until some years later.

In 1904 Dr. Moore joined the Research Department at Woolwich Arsenal, where he remained for twenty-eight years, being Director of Metallurgical Research from 1919 to 1932. The scientific staff of his branch of the Department did not exceed four until some time after the outbreak of war, when the innumerable problems to which answers were urgently required by the Navy and Army necessitated a rapid expansion. Since that time the Metallurgical Branch of the Research Department, Woolwich, has remained one of the largest metallurgical laboratories in this country.

In his earlier years, Dr. Moore's work was mainly concerned with steel. His laboratory was responsible for many investigations upon the properties and heat-treatment of alloy steels, methods of testing (*e.g.*, indentation hardness tests and notched bar tests), the effects of overstrain and of cold-work, elastic properties, etc. During this time he gradually became more interested in the non-ferrous metals and alloys, chiefly in connection with the components of gun and small arms ammunition. He was elected a member of the Council of the Institute of Metals in 1924 and vice-president in 1932, and has served as chairman of the Publication Committee.

It was in 1922 that research on the casting of brass ingots was undertaken under Dr. Moore's direction for the British Non-Ferrous Metals Research Association, and this led to a gradually increasing co-operation between the Association and the Research Department, Woolwich, which undertook work on lead cable sheathing (in the course of which the widely used B.N.F. ternary alloys of lead were developed), electrodeposition of nickel, tin coatings, etc. In 1932 Dr. Moore accepted the offer of the post of director of the British Non-Ferrous Metals Research Association, which had become vacant through the election of Dr. R. S. Hutton as Goldsmith's Professor of Metallurgy, University of Cambridge.

FROM experiments which have been carried on for a considerable time by Dr. H. K. Sen, University College of Science, Calcutta, it has now been demonstrated that cheap power alcohol can be produced from water hyacinth at a low cost of 4 annas per gallon. The water hyacinth in Bengal grows wild in abundance and obstructs waterways and is regarded as a pest deserving to be eradicated. The earliest experiments yielded power alcohol with valuable manures as by-products, but the cost of production seemed to be prohibitive. By further experiments Dr. Sen has been able to effect bacterial decomposition, producing 24 gallons of spirit from one ton of water hyacinth. It is stated that during the decomposition process a gas of a high calorific value is released and can be used for lighting purposes, while the residues provide valuable manures.

Chemical Machinery and Plant Records

By S. HOWARD WITHEY, F.C.I.

PHYSICAL inventories of profit-earning equipment employed in chemical manufacturing and engineering operations comprise a wide variety of different types and specifications, with the result that difficulties are often experienced in keeping careful and constant observation of specific units or sections of plant. It is true that in some instances a departmental manager is able to decide the amount of depreciation to be written off the complete inventory for balance sheet purposes, but taking the chemical industry as a whole it is not possible to control productive operations and to ensure that maximum efficiency is obtained unless detailed records are kept of each group of assets or combination of machinery.

Many firms now keep machinery and plant ledgers in which separate accounts are opened under the principal headings, and although a considerable degree of accuracy is called for in the allocation and distribution of capital outlay, such records need not be unduly intricate. By means of cards kept in a drawer, and maintained in position by a rod or other similar device, an effective internal check and control can usually be exercised, a detailed description of each unit being set down, together with particulars connected with the cost of acquisition, the transport charges, and the installation or foundation expenses. Such records will provide information necessary to facilitate decisions in the matter of the employment of new or more productive equipment, these decisions being usually governed by the behaviour of the assets previously used, and by the cost of repairs and maintenance involved in the particular manufacturing or engineering processes.

Typical Record Cards

To be of any real practical utility, the equipment used for similar purposes should be grouped, and the totals summarised to show at a glance the precise number of each class or type, also all variations which have been made during a particular year or operating period. The number of units may be greater than the productive capacity of the business demands, or, on the other hand, the output may easily be retarded by the use of inadequate equipment, or by an insufficiency of the right types, consequently a physical control, when systematically exercised, cannot fail to ensure a considerable degree of economy of operation. A re-arrangement of certain machines may enable one or two units to be discarded, and costs to be materially reduced, the remainder being installed to much better advantage, and apart from the fact that detailed plant records greatly facilitate the computation of depreciation resulting from wear and tear, obsolescence, or effluxion of time, and enable the management to ascertain the balance of unrecovered investment with greater accuracy than would otherwise be possible, the figures may be the means of securing successful and satisfactory claims in the matter of rating assessment, tax assessment and insurance.

At the top of each card sufficient space may be reserved for such particulars as the exact location of the particular equipment, the size, weight and constructors number, and a description of any attachments. Columns or sections may also be provided for the insertion of the invoiced cost of acquisition, the transportation cost, and the expenses incurred in the installation of the equipment prior to its employment. A good general pattern of equipment card is reproduced in the next column.

Displaced Units

It should be observed that the cost of additions is provided for, and this includes the cost of any alterations or improvements that have had the effect of increasing the value of the plant as a factor in the maintenance or expansion of profitable turnover. By using a special form of card, the records may be summarised in departmental total which enable separate departmental accounts to be made up periodically.

When certain units are replaced by others possessing a greater productive efficiency, the debit balance representing the value of the displaced units should be written off and charged against the periodical profits, the cost of acquiring and installing the new units being capitalised by posting the individual items direct from the cash book, or from the purchases journal, to the debit side of the particular asset account. Sums realised upon the disposal of discarded equipment may be credited direct to profit and loss from the receipts side of the cash book, although the better method consists of crediting the asset account before writing off the value displaced. For costing purposes, variations in the annual charge for upkeep and repairs can be avoided by estimating the total cost of maintenance over the period of service or useful life, this total, plus the first or original capital value of the assets, giving the amount to be spread over a definite period. By adopting this method the annual charge for inclusion in the costs will remain at the same figure, the items

WATER SOFTENING PLANT.

Description ....
....
Location ....
Type .... No. ....
Capacity ....
Size ....
Auxiliary Apparatus ....
Attachments ....
....

Date of Installation ....19.. Invoiced Cost £ :
Estimated Service Life ...... Years. Rate of Depreciation ......%

Date. ....19..	Voucher No.		£	s.	d.
		Cost of Acquisition			
		Transport Charges			
		Installation Expenses			
		Cost of Attachments			

BACK OF CARD.

Value as at.....19..				Value as at.....19..			
Deduct Depreciation written off ..				Deduct Depreciation written off ..			
Reduced Value ..				Reduced Value ..			
Additions				Additions			
Value as at.....19..				Value as at.....19..			
Deduct Depreciation written off ..				Deduct Depreciation written off ..			
Reduced Value ..				Reduced Value ..			
Additions				Additions			
Value as at.....19..				Value as at.....10..			
Deduct Depreciation written off ..				Deduct Depreciation written off ..			
Reduced Value ..				Reduced Value ..			
Additions				Additions			

representing expenditure actually incurred being debited against a reserve account.

A distinction should be drawn between the many daily repairs and adjustments of a relatively trivial nature and the larger maintenance jobs, the former being preferably debited to standing orders. When all repairs and renewals are shown on the debit side of one general repairs and renewals account kept in the nominal or expenses ledger, it should never be forgotten that if the book value of displaced equipment has already been charged to profit and loss, the full cost of replacement must be capitalised by means of a transfer to the asset account. By using a pattern of purchases journal, or bought day book, which has been provided with a number of columns or sections for the systematic classification of capital outlay, the items to be capitalised can be collected in the form of monthly total for ledger posting purposes, and it is a good practice to keep an inventory of the

business assets, this inventory being divided into sections corresponding, as near as possible, with the headings under which the original transactions have already been analysed, and with the different specifications and capacities. Each entry made in the inventory should give the name and number of the invoice or other debiting document, the name and address of the constructor or supplier, and a sufficiently detailed description to enable the various units and groups to be readily identified. This is a most convenient way of presenting the information to the management.

Much of the difficulty associated with the keeping of machinery and plant records can be overcome if the principles that govern discrimination between capital and revenue items are borne in mind. In this connection, a few typical examples will suffice to indicate the correct procedure. The cost of purchasing new or additional equipment is, of course, a capital charge, as also are the carriage charges paid on same up to the arrival of the equipment at the works. The cost of repairs which are found to be necessary when second-hand or reconditioned equipment is bought should also be capitalised, but ordinary repairs and overhauls should be debited to profit and loss. An adequate sum should be written off each year to cover depreciation, these amounts being credited to the asset account and debited to depreciation account, while the book value of displaced equipment should also be written off. The cost of installing electric light, telephones, and fixtures, is a capital charge, including the wages paid out to employees engaged in any such operations, but expenses incurred in the maintenance of the installations must be charged against the periodical profits.

Analytical Methods in the Brewing Industry

Some Recent Developments

THE report on the fermentation Industries for 1933, prepared for the Society of Chemical Industry and the Institute of Brewing, by R. H. Hopkins, D.Sc., F.I.C., and F. W. Norris, Ph.D., A.I.C., states that the appropriate type of oven for use in the determination of moisture in barley or malt constitutes a problem which is receiving much attention nowadays. A. E. Case (" J. Inst. Brew.," 1933, 37) finds that malt dried for 3 hours at 99° in an electric oven carrying one 6-in. chimney yields 0.2 per cent. more moisture (average of 25 samples) than when dried similarly in a water oven protected by an " apron " front and sides, carrying two 6-in. chimneys. The Institute of Brewing has revised its Standard Method of Analysis (" J. Inst. Brewing," 1933, 518) and, so far as the determination of moisture in malt is concerned, recommends the adoption of an electric heater for the oven. Lindemann (" Tagesztg. Brau.," 1933, 31, 250) compares a number of ovens in use on the Continent and prefers the Ulsch oven, which is heated by tubes containing steam at any desired pressure which can be regulated. By regulating to secure a temperature of 106° (223° F.), moisture was driven off to within 0.2 per cent. of the total within 45 minutes and the author recommends drying for 60 minutes only, and the addition of 0.1 to the percentage of moisture obtained. T. S. Miller (" J. Inst. Brew.," 1933, 428) investigating the exact measurement of moisture in barley, finds that it is necessary to dry *in vacuo* at 110°-115°. The degree of grinding is not of great significance if this condition is secured, but is of importance if drying is performed in a water oven at 98°.

Physico-Chemical Methods

The application of physico-chemical methods to analysis is steadily increasing and has many advantages, of which rapidity and neatness of operation are not the least. On the Continent the Zeiss immersion refractometer is being increasingly used for the determination of extract from malt, with an accuracy of about ±2 parts per 800 of extract present. The apparatus is readily used and the extract is calculated from formulæ; the results are not appreciably affected whether the worts are pale and clear, or dark and cloudy, according to V. Berglund and W. Emlington (" Woch., Brau.," 1932, *49*, 324). A photographic method for estimating the colour of closely similar malt worts is advocated by H. Krwawnik (" Woch. Brau.," 1933, *50*, 165). In this method the worts are placed in glass capsules which are traversed by a beam of white light which falls ultimately on ordinary photographic gaslight paper. After a suitable exposure the prints may be developed and fixed and compared with standards prepared in the same manner.

The well-known phenomenon of fluorescence exhibited by many substances when irradiated with ultra-violet rays has also already found many applications in academic and commercial laboratories. S. Pickholz (" Brau. Malzind.," 1932, *25*, 20; " Z. ges. Brauw.," 1933, *56*, 36) has examined the fluorescence of barleys under irradiation and found differences between pale and fine barleys and dark and coarse barleys, but old corns were indistinguishable from new; steeped corns gave colours varying with the acidity or alkalinity of steep water. The most successful application of examination by ultra-violet rays was the identification of colouring matter added to beer. The colours produced by added caramel or sugar are easily distinguishable from those derived from coloured malt.

Colorimetric Determinations

The difficulties inherent in the application of the colorimetric method of determining *pH* in certain cases require no stressing. The use of the colorimetric method with cloudy or highly coloured liquids is frequently so difficult that resort must be made to the electrometric method. G. Pichard and R. Chaminade (" Ann. Brass. Dist.," 1932, *30*, 324) describe a method based on the extraction of the indicator from its aqueous solution by immiscible neutral organic solvents. The alkaline and acid forms of indicators are soluble to different extents in organic solvents. Similarly, the colours of the two forms in such solutions are different one from the other, although neither may exhibit the same colour as in aqueous solution. Furthermore, the zone of colour change is displaced towards alkalinity, depending on the ratio of the partition coefficients. Using isobutyl alcohol as solvent, the range of *pH* covered by a number of indicators has been determined, and the method applied to the determination of wine acidity and the *pH* of soils. The solvent chosen must not extract colouring matter from the liquid under examination.

K. Schmorl (" Pflanzenbau.," 1932, *9*, 232; " Woch. Brau.," 1933, *50*, 80) surveys the available methods for moisture determination, which may be classified into three main groups; drying methods, by various types of oven; chemical methods, which include toluene distillation and the calcium carbide method exemplified above; and electrical methods based on measurements of dielectric constants and conductivity. In the author's opinion, methods based on measurement of dielectric constants are rapid and give results very close to those obtained by oven-drying. On the other hand, H. E. Hartig and B. Sullivan (" Ind. Eng. Chem.," Anal. Edit., 1933, *5*, 107) report adversely on the value of electrical methods for moisture determination in wheat. They used 50-gram samples of unground wheat, in a flat vulcanite cell, which is placed between the plates of a condenser connected in circuit with a capapcity bridge whereby the equivalent capacity and resistance are recorded, the moisture content being read on a previously calibrated chart. In comparison with results by the Brown-Duval distillation method variations were noticed. Different varieties of wheat with the same moisture content gave different results by the electrical method, whereas identical readings were obtained with three samples of the same variety of wheat having different moisture contents. It is concluded that the electrical method gives only approximate values for the moisture content of the unground cereal.

Letters to the Editor

The Editor welcomes expressions of opinion and fact from responsible persons for publication in these columns. Signed letters are, of course, preferred, but where a desire for anonymity is indicated this will invariably be respected. From time to time letters containing useful ideas and suggestions have been received, signed with a nom-de-plume and giving no information as to their origin. Correspondence cannot be published in THE CHEMICAL AGE unless its authorship is revealed to the Editor.

Employment in South African Gold Mines

SIR,—In your report of Dr. Herbert Levinstein's Gluckstein Memorial Lecture on "The Chemist as a Directing Force in Industry" (THE CHEMICCAL AGE, December 23, 1933, page 568) the following statement is made:—"At the time of the debt settlement the nominal capital of the South African mines amounted to . . . . It employed 200,000 people, of whom less than 10,000 were white."

The statistics issued by the Department of Mines of the Union of South Africa for December, 1933, showed that at December 31 the gold mines of the Union of South Africa employed 28,138 Europeans and 253,222 natives. These figures do not include the Europeans and others employed in mining company head offices, the Chamber of Mines, and concerns directly allied to gold mining. At no period during the last 30 or more years have the gold mines regularly employed so small a number as 10,000 Europeans. As your journal has a wide distribution, it is thought that you, perhaps, might like to correct the figures that have been published.—Yours faithfully,

W. GEMWILL,
General Manager.

Transvaal Chamber of Mines
Gold Producers' Committee,
Johannesburg.

Industrial Wastes

SIR,—With reference to the article on "Industrial Wastes" which appears in THE CHEMICAL AGE, February 17, I beg to offer some remarks which may be of interest. About 1892 I began to use spent kier liquors to make up the succeeding batch of liquor for the next boil. This was done by blowing out from the finished boiling, by steam, and collecting in a cistern. To this was added new alkali to bring the liquor up to strength and seeing that this was equal to adding soap (resin soap) the resin was left out and an economy thereby effected.

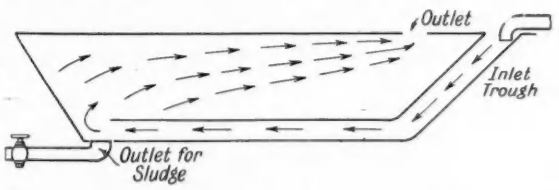
About 1894 we changed from the lime and soda (Na_2CO_3) bleach, to the caustic (Na CH) process, when we began to causticise our soda and to catch all waste liquor we increased our storage capacity. The lime was slaked with the return liquors. The soda dissolved in same and after the process when the first caustic liquor ran off, the chalk was twice washed with the returned liquor. About 1898-9 we began to mercerise, so that by using the washings for the process we did not need to make caustic soda. We therefore mixed the mercerised washings with the returned liquors.

As the mercerising business grew we had more of the two liquors than the bleaching (then about 100 tons a week) could use. This meant waste of one or the other—clean caustic or soapy brown liquor. In 1902 I patented my method of caustic soda washing recovery. This method has since been used in all countries where the process was carried out. The method was that of counter-current washing and the fractions were:—(1) 25°—30° Tw.; (2) 12°—16° Tw.; (3) 5°—6° Tw.; (4) 2°—0° Tw. As much of fractions 1 and 2 were used for process of fixing metallic oxide colours and bleaching as was required whilst the excess of these were brought to a strength of 20° Tw., when the slaked lime was added; boiled and settled in a 1,000 gal. cistern with tapered bottom. The clear liquor was used to dilute the mercerising liquor. The weaker fractions 3 and 4 made up the charges for the kiers.

The annual saving in pre-war days on the mercerised washings was £2,500 and the brown kier liquors £1,000. We bleached an average of 114 tons per week for three consecutive years.

The Shirley Institute (about 1923-4) found that the kier liquors greatly improved the bleach and was also a great economy. This was looked upon as something new and was brought before the Royal Society and published in the "Manchester Guardian" and the technical papers.

About 1892 the Mersey and Irwell Joint Rivers Board pressed us to clear our effluent. Up to then the various waste waters ran straight into the river. We were told that colour did not matter so long as it was innocuous; to this end all dirty water was sent in the cleansing and settling reservoirs and tanks. The first catchment held some 400,000 gallons, and was built something like this:—



The nature of this effluent is changing every minute—sometimes acid and sometimes alkaline, soap, gummy, size, mordants, colours, etc. Most of the noxious matter dissolves in alkaline water so that it is best to try to keep the average on the acid side. This state could only be obtained by the soda economy in the works. This keeps the mordanting and precipitating elements in the effluent in a state that it grips the fatty and colouring matters. This fatty complex picks up some colours to form lakes. The Mg C12 from weavers sizings; barium chloride; Epsom salts all precipitate with alkali. This precipitate then picks up direct and sulphur colours, alumina compounds and arseniate-mordant colours, and so on. The water effluent—where it meets the mass—at the end of the inlet trough keeps the whole mass in a state of swirl or agitation, so that there is a big settling near there when the water ceases at the end of the day. Next morning this is run off at the settling outlet. From the overflow outlet the water passes through other settlers the bottoms of which all slope towards the bottom outlet (for sludge). The water overflowing from top passes on to cinder filters and then to the river. The sludge from all settlers runs on to a sludge dam, which is formed by a cinder bank at the bottom edge of a sloping bank. The depth of this bank varies up to 6 ft. and the area is about 70 yards by 25 yards. For nearly 40 years the sludge has been accumulating and it is not yet nearly full. The mass is sour and is always fermenting. Material which is taken from the bottom and dried in the bank will burn on a fire; it smells when burning like so much oil and leaves a big ash.

Starchy matters such as old printing colours and finishing pastes are not thrown into the sewers; the clean white pastes are put into the glucose making tub and used up with the Indian corn starch. The coloured and dirty pastes are used in place of sugar, and the like, for reducing chromic acid.—Yours faithfully,

W. WARR.

Moorgate,
Stalybridge.

Heavy Hydrogen

SIR,—We have read with interest your editorials on the subject of heavy hydrogen. Apparently everything else is fairly simple compared with the problem of finding a suitable and acceptable name.

As former pupils of Sir J. J. Thomson, we think your suggestion of the name "Jjanium" a very happy one. However, in case it does not prove acceptable, we should like to suggest the name "Hevigen" or "Heavigen" contracted from "heavy hydrogen."

We have already tried it on a classical friend, who des-

cribed the name as an awful hybrid. He preferred the alternative "Barygen." From the strictly classical point of view the latter is undoubtedly a better name, being derived entirely from Greek roots. We understand, however, that it has been considered and turned down.

In the case of light hydrogen, if it is felt that a name is required, it will be more difficult to avoid the use of a hybrid, because the Greek word for "light" occurs in very few English words. "Levigen," however, would be readily understood.

If one could ignore all considerations of hybridism, "Levigen" and "Hevigen" appear to be very neat names for light and heavy hydrogen respectively. The respective symbols could be Hl and Hh, which would obviously be at least as convenient for writing formulæ as D, the symbol for diplogen.—Yours faithfully,

R. H. ATKINSON.
C. JOHNSON.
The Mond Nickel Co., Ltd.,
Refinery and Research Laboratory,
London, N.W.10.

Chemical Matters in Parliament

Third Reading of the Dyestuffs Bill

ON March 5 the House of Commons considered on report the Dyestuffs (Import Regulation) Bill which amends the Dyestuffs (Import Regulation) Act, 1920.

Mr. G. W. Rickards (Skipton) moved an amendment to Clause 3, which deals with the constitution of committees, in which he proposed that the persons appointed by the Board should be five representing the textile industry, two representing the chemical industry, two representing chemical science, and two representing any Government Department specially concerned. He said this was a matter of vital importance to the users of dyes. They were not against the dyestuff makers being helped and protected. Tariffs had, in fact, saved their trade. Since the tariffs his firm had employed more workers and paid better wages.

Mr. J. R. Remer (Macclesfield), who seconded, said that the amendment was designed to prevent the over-weighing of the committee by dye-makers to the detriment of dye-users.

Imperative Need for Goodwill

Mr. Holdsworth (Bradford, S.) said he was absolutely in sympathy with the purpose of the amendment. It was essential that, in the working of this Act, there should be goodwill between the users of dyes and the makers, and that there should be a spirit of amity in the committee. He was, however, not quite sure that the amendment would be the best thing in the long run for the textile industry. The difficulty when a certain number is stated for the committee is that the number of the committee is thereby limited. The clause left it to the Board of Trade to appoint what they consider adequate representation of all the different interests.

Major Procter (Accrington) supported the amendment, because he believed that this committee should not be weighted by the industry which is to derive the chief advantage from it. He said it was of tremendous importance to the textile trade that it should have on the committee representatives of the various sections of the textile industry who can speak as consumers.

Dr. Burgin (Parliamentary Secretary, Board of Trade) asked the House to reject the amendment. Under the Bill the Board of Trade had absolute power to determine the number of the committee and to appoint to it from time to time such persons as it thought fit. The committee was purely an advisory one, and the persons appointed to it would not be chosen to represent specific interests. The Board of Trade would bear in mind the interests of all branches of the industry.

The amendment was then withdrawn.

Price Fixing

Moving an amendment to provide that, on a report being made by the Import Duties Advisory Committee, the Board of Trade might by regulation make provision for the fixing of the prices of dyestuffs, Mr. Rhys Davies (Westhoughton) said that the Parliamentary Secretary knew full well that the quarrel between the dyestuff makers and the colour-users arises in the main from the high price charged for colours. The amendment dealt specifically with those prices. The provisions of the Bill had created a great deal of discussion, particularly in Lancashire and Yorkshire, because there was a battle going on between the textile industry of Lancashire and Yorkshire on one hand and on the other hand the monopoly created by these duties in favour of Imperial Chemical Industries, Ltd. That battle had now been raging for some years, and the amendment would have the effect of satisfying the colour-users that they were not going to be exploited in future by the monopoly of the Imperial Chemical Industries.

This amendment was rejected by 222 to 27.

Protection of Consumers' Interests

On the motion for the third reading of the Bill, Dr. Burgin said the Bill followed the recommendations of the Import Duties Advistory Committee and had been drafted to give effect to those recommendations.

Mr. Rhys Davies pointed out that in the original Dyestuffs Act it was stipulated definitely that it should only last for 10 years. It was never intended to prevail as an Act of Parliament except to help the dye-making industry to establish itself in this country. That industry had established itself in such a way as to create a monopoly, and by creating a monopoly under cover of the prohibition of dyestuffs from abroad, it had increased the prices to the colour users of this country out of all proportion. The colour users were right in saying that they had been exploited by two elements. First of all, the Government want the dye-making industry to maintain itself in an efficient position in order that the Service Department may always be certain of the necessary ammunition in case of trouble with some other country. On the other hand, the Imperial Chemical Industries, Ltd., had without a doubt established a monopoly behind this prohibition, and there was no doubt that that monopoly was operating unfairly to the colour users of Lancashire and Yorkshire.

Mr. Holdsworth said that he had opposed the Bill from beginning to end and intended to vote against it now, but he hoped that if it became an Act the interests of the consumers of dyestuffs would be looked after as well as those of the producers.

Mr. J. R. Remer (Macclesfield) said that they were now completely satisfied that the Board of Trade had the powers they were anxious for them to have. While he voted against the Bill on the second reading he did not propose to oppose it on the third reading.

The third reading was then carried by 193 to 38.

Power Methylated Spirits

On March 1 Captain Erskine-Bolst asked the Financial Secretary to the Treasury whether any statistics were available to show the amount of alcohol used in this country for the purpose of motor fuel; and, if so, what was the amount used during the latest quarterly period for which figures are available.

In reply, Mr. Hore-Belisha said statistics of the quantities of alcohol used for the purpose of generating mechanical power are shown in Table 29 in the Annual Report of the Commissioners of Customs and Excise, in which both the quantities of spirits received for the manufacture of power methylated spirits and the quantities of power methylated spirits are shown. The quantity of power methylated spirits issued during the three months ended December 31, 1933, was 73,677 bulk gallons.

Automatic Boiler Control

Easy Means for Effecting Fuel Economy

TWO systems of automatic boiler control which enable boiler plants of every size and description to be operated continuously at the highest possible degree of efficiency, have been introduced by George Kent, Ltd., Luton and London. The electrical system is intended mainly for large generating stations and the hydraulic system for industrial boiler plants.

The first example of the electrical system was installed at the generating station of the Hackney Borough Council, London, on three boilers with an output of 150,000 lb. per hour. These boilers had d.c. motors on the forced and induced draught fans, and on the stokers, while the draught had to be controlled by dampers in sequence with the fans when the latter had reached their bottom speed. Special motor speed regulators were designed to give close control having 200 studs, and the dampers were operated by motor units provided with a device permitting hand control from the firing floor. The master controller worked on a special

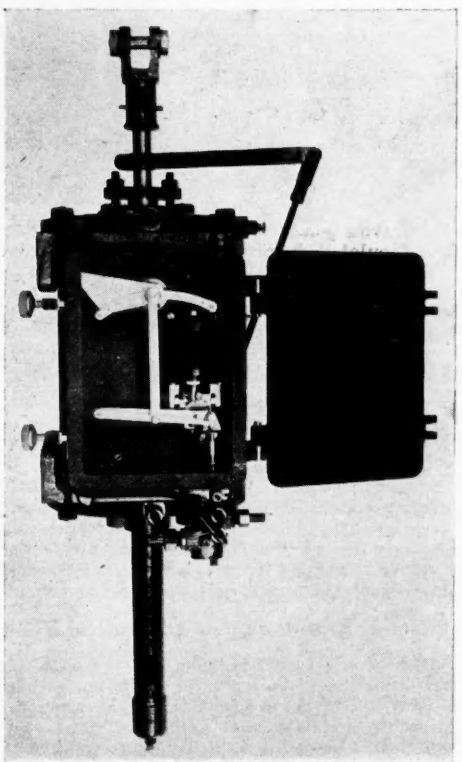


Fig. 1. The Hydraulic Power Unit for Damper Control.

principle which enabled it to achieve greater accuracy and speed in meeting load changes than would have been possible by any contemporary type of controller. This installation has been working for over two years, and it is estimated that it paid for itself in less than six months in fuel economy and general maintenance alone.

The hydraulic system of control was introduced some little while after the electrical system, and had an immediate success. It is already installed in a number of stations from the smallest industrial plant, using partial control only, to municipal power stations. An installation will shortly be in operation at an important generating station in South Africa, where it will control the draught and fuel supplies of nine boilers. Electrical and hydraulic systems of control operate on the same general principles. A master controller measures the steam pressure at some convenient point in the steam range, preferably near the load, and sends out a control impulse to the equipment operating the damper or fan speed regulator on the boiler outlet draught. When forced draught is used it is adjusted by impulses from a second type of controller to maintain a constant suction at a convenient point in the combustion chamber. A third unit measures the pressure drop across the boiler passes or in the air ducting and

Fig. 2. Fuel-Air Ratio Controller and Motor Speed Regulator mounted on a Panel at Boiler Instruments.

adjusts the rate of fuel feed to the value which has been found to give the highest efficiency of combustion at that rating. The controllers are not interconnected so there is no

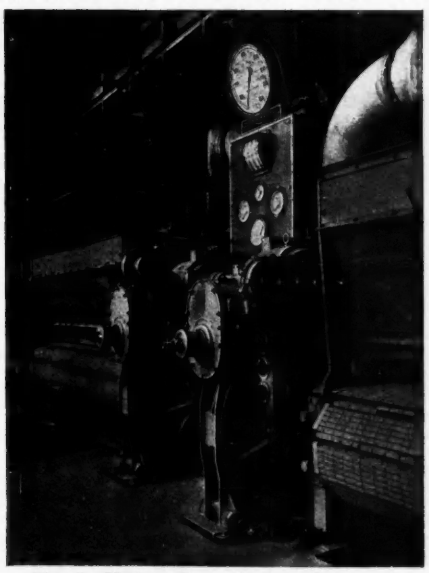


Fig. 3. Hackney Power Station. Battery of boilers operating under Kent Automatic Control.

difficulty with interlocking relays, or devices to superimpose the signals of one controller on another. This enables the boilers to be operated with any degree of automacity; by cutting off the control of the induced draught and adjusting it by hand, a boiler can be used on a base load, with the firing conditions looked after by the controllers on the forced draught and the fuel.

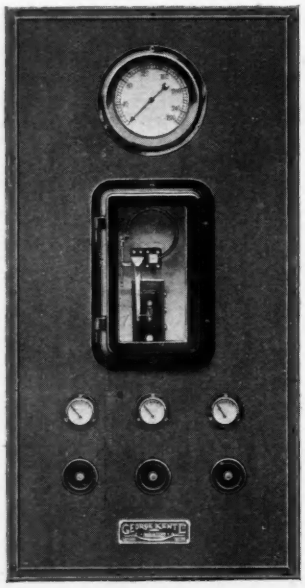


Fig. 4. The Master Control Panel employed in the Hydraulic System.

In the case of the electrical system, the signals are impulses of varying length and switches enable any controller to be put out of action at will. Other switches provide remote manual control on any of the controller circuits and are arranged so that they over-ride the impulses of the automatic controller. In addition, hand control is provided by hand wheels on the damper operating units and speed regulators. The hydraulic system does not set out to provide these facilities. Either the automatic control is in use or it is disconnected, and hand control used. The system does, however, provide all the most important benefits of accurate control, in a manner that is easily understood by apparatus that is robust, reliable, and reasonable in cost. Either system will work with draught control by damper or by any of the usual methods of fan speed regulation, and can be adapted to any system of firing.

Development work has resulted in the Kent systems of control being able to operate successfully with hydraulic couplings on applications such as stokers or raw coal feeders to pulverising mills, as well as fan drives. Hydraulic couplings have long offered the advantages of a large speed range and exact adjustment, but have suffered from a tendency for the output speed to vary considerably and from a delay in reaching a new speed after any adjustment.

The automatic control of boilers has passed out of the experimental stage, and it is possible to point to such a rapidly increasing number of successful installations that there can be no doubt of the general use which will be made of it in the next few years. For small plants the economies in fuel alone are very attractive, while some of the larger boilers are almost impossible to operate for more than short periods by hand control. When the automatic governing of engines and turbines was first introduced, one of the arguments against it was that it increased the number of things to go wrong, but nowadays it is in universal use. The same objection is sometimes levelled at automatic boiler control, but boiler control will no doubt also become universal.

Fig. 5. The Master Control Panel, Electrical System.

Cadmium Pigments for the Enamel Industry

The Most Favourable Conditions for Manufacture

TWO methods are available on the industrial scale for production of cadmium sulphide. Direct precipitation may be practised by passage of sulphuretted hydrogen into a solution of cadmium sulphate or chloride; alternatively an indirect method is applicable where a suspension of an insoluble cadmium salt; usually the carbonate is exposed to the action of an alkaline sulphide. Both of these methods have formed the subject of critical study by L. Stuckert, who outlined the most favourable working conditions in recent issues of the " Farben-Zeitung " (January 6 and 13).

Filtration Difficulties

Difficulty in filtration owing to the extreme fineness of the precipitated particles was overcome by starting from a solution of normal concentration (10.4 per cent. cadmium sulphate) and maintaining the mixture within the temperature range of 40 to 50° C. Preliminary acid addition to the solution likewise makes for precipitation of easily filterable coarse granules, hydrochloric being more effective than sulphuric acid.

Colloid substances, like gelatine and water glass, also bring about appreciable increase in particle size. Excessive hardness of the finally dried particles can be avoided by low-temperature drying or by using alcohol to expel the last traces of moisture from the thoroughly washed precipitate.

Sulphides obtained by precipitation of soluble cadmium salts with sulphuretted hydrogen are excellently suited to the requirements of the ceramic industries, but are useless for conversion to cadmium red by roasting with selenium metal. In spite of the pure red tone of the selenium pigment derived from the sulphide originating from cadmium sulphate solution, its tinctorial strength is inadequate for ceramic glazes. Still more disappointing is the selenide obtained by way of cadmium chloride solution, which generally goes black during the ignition process. An alkali sulphide as the precipitating agent in place of sulphuretted hydrogen leads to cadmium yellows of no value as ceramic clouding agents owing to their inferior colour strength. They are also incapable of forming cadmium reds of reasonable quality.

Effect of Reaction upon Theoretical Yield

To obtain good ceramic pigments by the indirect process the author recommends stirring the cadmium carbonate suspension with a 5 to 10 per cent. alkaline sulphide solution either at boiling temperature or in the cold. Under the former conditions, increased yields result if the precipitated carbonate is decanted two or three times. Of great interest is the discovery that the cadmium sulphide yield is entirely independent of the interval between carbonate precipitation and reaction with the sulphide, for certain literature references stress the importance of a ripening period before the final reaction. Examination of the relevant data led to the conclusion that failure to obtain the theoretical yield, invariably experienced in practice is not an inevitable consequence of the equilibrium state. On experimental grounds, in fact, a close relationship would appear to exist between the yield of sulphide and the size of the cadmium carbonate particles.

As a basis for cadmium red manufacture and in respect of colour constancy, the product of the indirect process is superior to the sulphide got by direct precipitation, but is unfortunately contaminated with varying proportions of uncharged carbonate. The latter can best be eliminated in the author's experience by treatment with hot or cold dilute sulphuric acid. Suitable measures to deal with the ensuing violent reaction must be taken if sodium sulphide has been used as the sulphiding agent.

Notes and Reports from the Societies

Pharmaceutical Society

Lecture on the British Pharmaceutical Codex

AN evening meeting of the Pharmaceutical Society will be held at the Society's House on Tuesday, March 13, when a lecture on " The British Pharmaceutical Codex : Some Notes on its Revision," will be given by Mr. C. E. Corfield, B.Sc., Ph.C., F.I.C., the editor. Mr. Corfield, with six committees, has been working on the revision of the British Pharmaceutical Codex since 1930. A description of the new volume cannot fail to prove of the greatest interest to all users of this standard work of reference. The chair will be taken by the president at 8.30 p.m.

Microchemical Club

First Scientific Meeting Announced

THE newly formed Microchemical Club will hold its first scientific meeting on Saturday, March 17, at 10.30 a.m., at the Lister Institute, Chelsea Bridge Road, London. At 2.30 p.m. on the same day and at the same place, the first annual general meeting will be held to elect officers, adopt a constitution and transact other business. Communications on microchemical subjects are invited; they may deal with applications and development of micro methods in any branch of science. Communications can be sent to Dr. S. J. Folley, National Institute for Research in Dairying, Shinfield, near Reading.

The Bedson Club

Lecture at Newcastle-on-Tyne

THE Bedson Lecture was delivered by Professor J. Kendall at Armstrong College, Newcastle-on-Tyne, on March 2, the subject being " Elements, Old and New."

It was interesting to note, said Professor Kendall, that chemistry in its development as a science from alchemy as an art has passed through four distinct stages, in each of which one of the four elements of Aristotle—fire, air, earth and water—has been dominant. The fire period ended with the overthrow of the phlogiston theory by Black and Lavoisier, and was succeeded by the air period of " pneumatic chemistry," during which even the rare gases of the atmosphere only just missed discovery by Cavendish. Then followed an earth period, when a multitude of new metallic elements was isolated by analysis of rocks and " rare earths," and finally a water period, occupied extensively by the physico-chemical investigation of aqueous solutions. Just as atmospheric air was found by Raleigh and Ramsay to contain traces of unsuspected elements—argon, neon, krypton and xenon—so ordinary water has recently been shown to have present in it a minute quantity of a novel compound—*heavy water*. Each hydrogen atom in heavy water comprises two protons and two electrons, or twice the quota of an ordinary hydrogen atom, and this increased complexity involves a significant change in chemical as well as in physical properties. Pure heavy water, prepared by a series of fractional electrolyses, has a density more than ten per cent. higher than that of ordinary water. It freezes at 3.8° C., and boils at 101.6°. It retards the development of plant life, and proves fatal to certain lower species of animal life, such as tadpoles and flat-worms. What its effect, in pure and diluted form, upon the human organism may be is at present merely a matter for interesting speculation.

The Bedson Club, founded in 1927, consists of the advanced students and staff of the Chemical Department of the University of Durham and most of the industrial chemists of the district. The president is Dr. R. E. Slade, of Billingham, and the chairman is Dr. Riley, of Armstrong College, Newcastle. Dr. Bedson is Professor-Emeritus of the College and now lives at Purley. The membership of the club is about 120. Members of the Chemical Society, the Society of Chemical Industry and the Institute of Chemistry are usually invited to attend.

Institution of Chemical Engineers

Joint Meeting with Petroleum Technologists

A JOINT meeting of the Institution of Chemical Engineers and the Institution of Petroleum Technologists will be held on Wednesday, March 21, at 6 p.m., in the Chemical Society's Rooms, Burlington House, London. " The Practical Testing of a Continuous Petroleum Still " will be the subject of a paper by Mr. A. H. Goodliffe, B.Sc., and " The Determination of Plate Efficiency in Fractionating Columns for Complex Mixtures " that of another paper by Dr. A. J. V. Underwood.

The President of the Institution of Chemical Engineers, Mr. W. Macnab, will preside.

These papers will deal with the practical application of testing to actual plant units. Mr. Goodliffe will give data obtained in a practical test on a continuous petroleum still, discussing heat balances and efficiency of fractionation. Dr. Underwood will speak about methods for ascertaining the quantities and compositions of reflux and vapour at any point on the column, in order to determine the efficiency of each plate.

The Chemical Society

Annual General Meeting at Birmingham

THE ninety-third annual general meeting and the anniversary dinner of the Chemical Society are to be held in Birmingham on Thursday, March 22. To ensure that all branches of chemistry and chemical industry are represented at these functions, the local sections of kindred societies and institutions and a number of industrial organisations have been invited and have agreed to co-operate. The arrangements for the meetings are under the direction of a reception committee, of which Mr. W. A. S. Calder is chairman, Professor W. N. Haworth vice-chairman, Mr. Geo. King, hon. treasurer, and Dr. W. Wardlaw (the University, Edgbaston, Birmingham) hon. secretary.

The Chancellor, Council and Senate of the University have invited the Society to hold its annual general meeting in the University at Edgbaston. The business portion of the meeting (open to Fellows only) will be held at 3 p.m. in a room adjacent to the Great Hall, and later Fellows and visitors will assemble in the hall, where after tea the Vice-Chancellor will welcome the company and Professor G. T. Morgan will deliver his presidential address. The anniversary dinner will take place in the evening at the Grand Hotel, when the principal guest will be Sir Austen Chamberlain, M.P.

On Wednesday night, March 21, the Lord Mayor will give a civic reception at the Council House, and on Thursday morning, March 22, visits will be paid to the works of Cadbury Brothers, the Dunlop Rubber Co., and Henry Wiggin and Co.

The Alchemists' Club

Humour and Humanism in Chemistry

UNDER the title of " Humour and Humanism in Chemistry " Professor John Read, of the University of St. Andrews, delivered an interesting lecture to the Alchemists' Club in the Chemistry Department of the University of Glasgow, on February 28, when Mr. N. E. Wallace presided.

Professor Read began by remarking that the 93rd element was the most important of all in chemistry, and the most generally neglected—and that was the human element. One of the main faults in the average science course, or science text-book was the neglect of this element. Only very dimly and perfunctorily, if indeed at all, were limned for us the personalities of the men who by their discoveries had made possible these courses of study and these text-books. This omission, said the lecturer, is to be regretted. It is responsible for many of the misconceptions of ourselves by our colleagues of arts and letters, who, from attending a limited number of strictly impersonal lectures on science have often deduced that the man of science is of necessity cold, formal

and aloof; narrow in outlook; insensible to the finer human emotions; incapable of expressing himself in the common tongue; devoid of humour and humanism; and a stranger to the humanities.

Professor Read refuted these views in an effective and picturesque way by taking his audience " with imagined wing " on a swift flight through chemical time and space, beginning at Thebes in B.C. 1550 and ending at Sydney in A.D. 1920. He brought forward evidence from diverse ages in support of his claim that the study of chemistry, if approached befittingly, might well be ranked with the humanities as a broadly educative and humanising influence. He redefined humour as the golden thread which runs through the whole history of chemistry—the real Philosopher's Stone—the universal catalyst. Present-day chemists, like their forebears, should value humour at its true worth; moreover, those chemists who aspire to become the leaders of the future should cultivate a discerning and sympathetic acquaintance with the past. Coming to recent times, he dwelt particularly upon humanistic traits displayed by Black, Dalton, Davy and Liebig. Davy considered Dalton " a coarse experimenter." Dalton wrote that the principal failing in Davy's character as a philosopher was that he did not smoke. Sir Walter Scott and Davy " delighted in each other, and the modesty of their mutual admiration was a memorable spectacle." Faraday owed his first appointment at the Royal Institution to the lamentable fact that Mr. Payne, a laboratory attendant, so far forgot himself as to strike Mr. Newman, the instrument maker.

Society of Chemical Industry

Manchester Section: The Ethers of Cellulose

THE Manchester Sections of the Society of Chemical Industry and the Oil and Colour Chemists' Association, and the Plastics Group held a joint meeting at the Engineers' Club, Manchester, on March 2, when Dr. T. Traill read a paper entitled " The Ethers of Cellulose." Dr. A. Schedler presided, and was supported by Mr. H. V. Potter, the chairman of the Plastics Group.

In recent years, said Dr. Traill, the patent literature has indicated that considerable industrial research has been directed towards the preparation and industrial exploitation of cellulose ethers. Methyl, ethyl, and benzyl ethers of cellulose are now on the market, but propyl, butyl, and amyl celluloses have not yet achieved commercial success, although several patents for their industrial application have been taken out. The properties which make the cellulose ethers attractive for technical applications are (1) extreme stability, including freedom from discolouration of films and coatings on exposure to ultraviolet light; (2) solubility in a wide range of cheap solvents; (3) relative non-inflammability; and (4) in some cases low hygroscopicity. The high cost of etherifying agents has, in most instances, retarded the technical development of cellulose ethers, which are consequently more expensive than either nitrocellulose or cellulose acetate.

Cellulose in its various forms—linters, woodpulp, viscose silk waste, etc.—has been used as starting material. In many cases the cellulose is first mercerised, being treated as in the first stages of the viscose process. Sheets of cellulose are steeped in soda solution, and to ensure thorough impregnation the cellulose may be surrounded with an atmosphere of acetaldehyde or carbon dioxide before the alkali is run into the mercerising tank. After draining, the swollen alkali cellulose is pressed and then comminuted, after which it may or may not be matured, according to the viscosity and solubility required in the final product. Oxidising or reducing agents may be added to accelerate or retard this maturing process. The etherifying agent, methyl chloride for example, is added to the soda cellulose. Solid caustic soda may be added before or after. Alternatively, the cellulose and caustic soda solution may be kneaded together and the etherifying agent added. The amount of caustic soda used bears a relation to the amount of etherifying agent present, and the viscosity of the product depends on the concentration of the caustic soda. The products, which are always a mixture of ethers, can be separated by fractionating their solutions.

The methyl ethers differ in their solubility in water and alkali, the solubility depending on the degree of substitution. Those which are water soluble find use as emulsifying agents, fixing agents for printing, thickening agents for textiles (where they possess advantages over starch and British gum), and as binding materials. One variety, known as Tylose, is edible and can be used for thickening salad dressings. The lower methyl celluloses, which are soluble in dilute alkali, give films of good tensile strength.

Solubility of Celluloses

The solubility of the ethyl celluloses varies in like manner, in this case according to the ethoxy content; those with an ethoxy content of about 5 per cent, are soluble in caustic soda on freezing, with an ethoxy content around 27 per cent. in water, and with an ethoxy content of about 47 per cent. in a wide range of organic solvents and also in drying oils. The last-mentioned variety can be used in dopes and has potentialities in the manufacture of non-inflammable celluloid. It can also be used in preparing thermoplastic moulding compositions. In view of its chemical stability and low hygroscopicity it possesses an advantage over cellulose acetate in the manufacture of these products.

Glycol cellulose has been obtained by various methods, but the process described by Schorger, in which ethylene oxide and alkali cellulose are allowed to react at room temperature, yields a product which is almost completely soluble in dilute alkali. No excess of ethylene oxide is required and the reaction is quantitative.

Benzyl cellulose as found in commerce is usually the dibenzyl derivative. It is soluble in a wide range of solvents, and has considerable industrial applications; in fact, its technical uses are somewhat similar to those possessed by cellulose acetate. The benzyl compound, however, has certain advantages over the acetate, notably in its resistance to acids and alkalis, whilst its low hygroscopicity is often a valuable asset This ether has been employed in the preparation of celluloid materials, moulding powders. and dopes, and its thermoplastic properties enable it to be used in the manufacture of gramophone records.

Edinburgh Section: Problems of the Food Industry

A CALL for broader distribution of purely scientific data collected in commercial laboratories, and a protest against the secrecy imposed by certain firms in that direction was made by Dr. L. H. Lampitt, when delivering the Jubilee Memorial Lecture of the Society of chemical Industry on " Some Fundamental Scientific Problems of the Food Industry " in Edinburgh.

It is only rarely, said Dr. Lampitt, that a firm has chemical knowledge which is of importance to that firm; it is seldom that to disclose the results of a chemical investigation would be to play into the hands of competitors. On the subject of fruit juice, he pointed out that no methods had as yet been found whereby freshness could be retained over a period of storage. Hit and miss methods were the order of the day, but they had failed completely to find a solution of the problem. Another outstanding case where fundamental work was necessary was in respect of flour. Meat had also been grossly neglected by the chemist, and it was impossible to say with any degree of certainty what changes took place when meat was in the course of preparation for consumption. The more visible and easily detected changes had been studied from the time the animal was slaughtered until it was ready for cooking, but the changes were little understood, particularly from the chemical point of view, and changes in the numerous bodies occurring in small amounts had received practically no attention. Owing to such lack of knowledge there was a conflict of opinion on the " quick " freezing of meat. Much work had been carried out on the subject, but having proved the one or the other, the effect of low temperature freezing on the innumerable constituents of the substance frozen still could not be evaluated.

On the subject of milk, Dr. Lampitt said he hardly knew where to start, so little was the knowledge available and so multitudinous the papers published. The variables in the study of milk were so many that perhaps the chemical world was to be excused for the little advance it had made in fundamental problems. Period of lactation, period of year and

breed were primary variables. The degree of change caused by bacteria, a factor often ignored. Absolute lack of knowledge of the constituents occurring in small quantities an upsetting factor when the study of the more important constituents was concerned. There were many people investigating milk and milk products, but they were so interested in the production and utilisation of it that they had little time for the chemistry of the subject.

Bristol Section: Molecular Structure of Fibres

THE X-ray interpretation of the molecular structure of fibres was the subject of a paper by Mr. W. T. Astbury, Textile Physics Laboratory, University of Leeds, read before the Bristol Section of the Society of Chemical Industry on March 1.

Ordinary optical examination, said Mr. Astbury, reveals in general only the state of external organisation of the body under illumination, but the methods of X-ray analysis, on account of the shortness of the waves used, reveal the state of internal, or molecular organisation. In the case of natural fibres it is always found that the fibre substance is built of extraordinarily long molecules (" chain-molecules ") lying either roughly parallel to the fibre axis (animal hairs, natural silk, etc.), or arranged spirally round the fibre axis (cotton, ramie, etc.), and that these chain-molecules are grouped into bundles of submicroscopic dimensions and of varying size and regularity (crystallites or " micelles "). Detailed analysis of the X-ray photographs of cellulose and of natural silk shows that the molecules in both are stereo-chemically fully-extended; and this is confirmed by tensile tests, which prove that the true, reversible elasticity of these fibres is of only a very limited range, so that excessive extension leads inevitably to an irreversible slipping, or internal " drafting," of the chain-bundles over one another involving either rupture or a permanent elongation which is well known and feared in domestic and trade circles.

The chain-molecules of natural silk (fibroin) are polypeptides in a fully-extended form; but this concept fails entirely to explain the common X-ray phpotograph of wool, hair, nails, horn, whalebone, spines, etc. (the protein keratin). Furthermore, animal hairs have remarkable, rubber-like long-range elasticity in water, and can be made to exhibit complete reversability of form over extensions up to roughly twice the original fibre length. Both these problems are elucidated by the discovery of the new X-ray photograph given by *stretched* hair, which is found to be actually analogous to that given by natural silk, whether stretched or unstretched. It follows, therefore, that the protein chains of stretched hair are also fully-extended polypeptides, while unstretched hair must be built of the same chains in some regularly folded state. *The mechanism of the long-range elasticity of animal hairs—perhaps their most valuable industrial asset—is thus that of a reversible intra-molecular transformation of the fibre substance* (*keratin*). It has been proposed to call the two stereo-isomers revealed by X-ray analysis, α-keratin and β-keratin, the former being the shorter, normal, form.

X-Ray Investigation

Further X-ray investigation shows that the long polypeptide chains of keratin are linked side by side by both covalent and electro-valent linkages between their amino-acid side-chains, so that the structure is in reality based on a kind of " polypeptide grid," the equilibrium form of which is a function of the nature and distribution of the side-chain linkages. This concept serves to explain very simply the manifold, and hitherto bewildering, elastic properties of wool and hair, and in particular the well-known " permanent set " which a stretched hair takes up when exposed to the action of steam. It also allows one to predict and interpret the newly-discovered phenomenon of " super-contraction."

X-ray studies of the protein of animal hairs appear to have laid the foundations of the stereo-chemistry of proteins in general, in that they have shown how to calculate the dimensions of the linked amino-acid residues and thence the state, if such exists, of intra-molecular folding, *e.g.*, in unstretched keratin, feather keratin, collagen, and gelatine.

Society of Public Analysts

Annual General Meeting

A MEETING of the Society of Public Analysts was held at the Chemical Society's Rooms, Burlington House, London, on March 2, the President, Mr. F. W. F. Arnaud, being in the chair.

Certificates were read in favour of Ronald A. Balding, Bertram E. Dixon, Arthur Glover, Ralph G. Harry, Reginald Milton, and Roy W. Watridge. The following were elected members of the Society:—Donald Burton, Arthur S. Houghton, Homi R. Nanji, Harold Overton, John M. Russell, and Walter F. Waters.

At the annual general meeting of the Society, which followed, the following were elected as officers and council for the year 1934:—President: John Evans, F.I.C. Past Presidents serving on the Council: F. W. F. Arnaud, E. Richards Bolton, J. T. Dunn, Bernard Dyer, Edward Hinks, P. A. Ellis Richards, G. Rudd Thompson, J. Augustus Voelcker. Vice-Presidents: L. Eynon, S. E. Melling, A. More, W. H. Roberts. Honorary Treasurer: E. B. Hughes. Honorary Secretary: G. Roche Lynch. Other Members of Council: A. L. Bacharach, H. E. Cox, F. G. Edmed, E. M. Hawkins, L. H. Lampitt, H. Lowe, C. H. Manley, C. E. Sage, J. R. Stubbs, J. F. Tocher, E. Voelcker.

Anniversary Dinner

An anniversary dinner to commemorate the sixtieth year of the foundation of the Society, was held at the Trocadero Restaurant, on March 2. The members and guests, who numbered 126, were received by the president, Mr. F. W. F. Arnaud, F.I.C., and Mrs. Arnaud, and Mr. Arnaud afterwards took the chair at the dinner.

The guests of the Society included the Rt. Hon. Lord Cornwallis, Sir Isidore Salmon, M.P., Sir Robert Robertson (Government Chemist), Sir William J. Pope, Professor J. F. Thorpe (President of the Institute of Chemistry), Professor G. T. Morgan, Mr. William Macnab (President of the Institution of Chemical Engineers), Sir Bernard Spilsbury (President of the Medico-Legal Society), Mr. Charles Porter (President of the Society of Medical Officers of Health), Dr. J. T. Dunn (President of the Society of Chemical Industry), Mr. J. F. Blackshaw (Dairy Commissioner, Ministry of Agriculture), Mr. James Stenhouse (President of the Institute of Brewing), Dr. C. B. Hampshire (Chairman of the Pharmaceutical Conference), Mr. J. Egerton Quested, Mr. R. B. Pilcher (Registrar of the Institute of Chemistry), and Mr. R. A. Beck.

After the toast of His Majesty the King had been honoured, the president proposed the health of the Houses of Parliament. He pointed out that Public Analysts owed their very existence to Parliament, for they were a direct outcome of the Food and Drugs Acts of 1860 and 1872, a large proportion of the regulations in which was incorporated in the 1928 Act. The Report of the Department Committee which was inquiring into the question of food standards was awaited with interest. Unquestionably, further legislation was required to bring our food laws into unison with those of other European countries and our Dominions Overseas.

Lord Cornwallis responded for the House of Lords, and Sir Isidore Salmon, M.P., for the House of Commons.

Sir William J. Pope proposed the toast of " Success to the Society." He deplored the fact that students were doing less analytical work at the present day than in his young days, as it meant a training in accurate scientific work. He envisaged the time when the Public Analyst would be called upon to undertake the accurate chemical determination of vitamins.

The President, replying to the toast, referred to the steady increase of the Society in numbers and in influence, and laid stress upon the fact that the Society's Journal had won for itself an international scientific reputation. Mr. Arnaud then proposed the health of Dr. Bernard and Mrs. Dyer. He said that Dr. Dyer had been associated with the Society from its inception and had been its President in 1897. Dr. Dyer thanked the Society for the toast.

News from the Allied Industries

Non-Ferrous Metals

THE PROGRESS OF THE SCHEME for restricting world supplies of tin was discussed at a meeting of the International Tin Committee, held at the Colonial Office, on March 5. The control has operated for two years and has doubled the price of tin. The recent meeting was largely concerned with the question of creating a reserve pool of tin to prevent undue fluctuation.

Artificial Silk

THE SUBSCRIPTION LIST in connection with the issue of £2,800,000 British Celanese, Ltd., 5½ per cent. mortgage debenture stock was closed at 9.30 on March 6, the issue having been very heavily over-subscribed.

SOME INCREASE IN NET PROFIT is shown by the Snia Viscosa Co., the Italian Rayon undertaking, the 1933 figure of 23 million lire, struck after providing 23 million lire for amortisation, comparing with 22,305,641 lire for 1932. The dividend is 14 lire per 200 lire share, or 7 per cent. for the year, against 6 per cent. The balance sheet shows liquid assets amounting to 276 million lire. At an extraordinary meeting to be held to-day the board will propose a reduction of the share capital to 300 million lire by the cancellation of 250,000 shares, which are the property of the company.

Tanning

THE 1933 FIGURES for the U.K. foreign trade in sole leather shows that the exports increased from 2,550 tons in 1931 to 3,150 tons in 1932, and 4,900 tons in 1933. The retained imports also increased by 650 tons, but there was a net excess export of 1,600 tons, which is the highest figure since 1929. Evidently the export trade in sole leather is slowly recovering. Reptile skin tanning and dressing has been very quiet during February but suede leathers are gaining in popularity and there is a big demand for dyes and pigments for the dyeing of nigger browns and blacks. The glazed kid section is still progressing and it is reported that a Leeds firm which has been producing 2,000 dozens per week is contemplating an extension to negotiate an output of 3,000 dozens per week. The cheaper end of the light leather trade, which caters chiefly for the home shoe industries, is very quiet and shows no promise of an early improvement. Cellulose leather finishers are working overtime on orders for sandal leathers for the forthcoming spring and summer trade.

Sugar

A SUPPLEMENTARY ESTIMATE of £450,000 was moved in the House of Commons on March 5, in respect of the subsidy on sugar and molasses manufactured from beet grown in Great Britain. This increased the total cost to £3,350,000. The vote was carried by 243 to 48.

A MEETING TO CONSIDER the regulation of the production and marketing of sugar and the possibility of calling a conference to agree on a sugar Convention opened at the Ministry of Labour on March 5. The Earl of Plymouth (Under Secretary for the Colonies), welcoming the delegates in the name of the British Government, said it was possible to discern a few signs that the trade depression was beginning to lift; but the world's economic difficulties were far from being over and it was as important as ever that prices should be raised, particularly the prices of such primary commodities as sugar. The British Government was therefore anxious to do what was in its power to assist the conclusion of a scheme for regulating the world's sugar production The task of the delegates was not to conclude any formal and binding agreement, but simply to examine the facts of the situation with a view to discovering whether there was a real prospect of world agreement on the subject.

Continental Chemical Notes

THE ESTABLISHMENT of a new adhesive factory at Cilli, in Yugoslavia, which will produce glue, gum solutions, etc., is reported by "Chemische Industrie."

* * *

STEPS ARE BEING TAKEN to re-open the nickel mines at Horbach in the Black Forest, which, according to "Metallbörse," are believed to have a minimum potential daily output of 100 tons nickel ore for a period of 100 years.

* * *

METHYL FORMATE CAN BE MANUFACTURED in almost theoretical yield by high pressure reaction of carbon monoxide with methyl alcohol in presence of sodium methyl alcoholate (German Patent 591,581).

* * *

A MIXTURE OF NAPHTHALENE with about 3 per cent. of nicotine has been patented as an anti-verminous preparation for poultry and dogs. According to the "Chemiker-Zeitung," kennels and roosts may be sprinkled with it and the risk of packing by poultry is avoided by tinting.

* * *

DIFFICULTIES ARE BEING ENCOUNTERED during superphosphate manufacture in Russian factories using the concentrate obtained by flotation of apatite derived from the great deposits on the peninsula of Kola, states the "Chemiker-Zeitung," March 3. Application of the usual acid treatment causes solidification to a cement-like mass, apparently because of the physical condition of the ore after flotation which favours abnormal deposition of fine gypsum crystals. Other methods are suggested for converting the raw ore into cheap fertilisers by direct chemical treatment avoiding flotation.

A NEW METHOD IS SUGGESTED for preparing phosphoric acid-hydrochloric acid mixtures (German Patent 590,807) by enclosing phosphorous pentachloride in containers which are opened after immersion in water.

* * *

IN UTILISING CELLULOSE MATERIAL (e.g., wood flour) as a source of oxalic acid, it is now proposed (German Patent 588,159) to solubilise initially by treatment with 70 to 75 per cent. sulphuric acid prior to reaction, preferably under pressure, with nitric acid or nitrogen oxides.

* * *

TRISODIUM PHOSPHATE AND ALUMINA can be prepared according to a recently published process (German Patent 590,661) by alkali autoclave treatment of crude aluminiferous phosphate under pressure at temperatures below 500° C. There is formed a mixture of trisodium phosphate and sodium aluminate which can be separated by known methods.

* * *

FOLLOWING Germany's national economic policy favouring the formation of industrial cartels, under governmental supervision, for improving conditions in distressed industries, a cartel organisation, known as the Association of German Lampblack Producers, has been established for regulating conditions in the domestic lampblack industry. The new cartel is expected to improve conditions in the lampblack industry by every possible means through the co-operation of interested German manufacturers and especially the avoidance of undue competition among the several producing concerns. It will provide for production quotas for the several manufacturers and the entire industry, adaptable to consumption trends, and will prescribe uniform prices for all producers.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

HYDROCARBON GASES, conversion.—Texaco Development Corporation. July 13, 1931. 406,326.

SULPHUR DYESTUFFS.—Imperial Chemical Industries, Ltd., E. Chapman and W. B. Waddington. Aug. 17, 1932. 406,280.

DYESTUFF INTERMEDIATE, process for the manufacture.—Imperial Chemical Industries, Ltd., N. H. Haddock and F. Lodge. Aug. 17, 1932. 406,281.

ALKYL FLUORIDES, manufacture.—E. I. du Pont de Nemours and Co. and W. A. Lazier. Aug. 19, 1932. 406,284.

HYDROXYLATED DIPHENYLS, manufacture.—E. I. du Pont de Nemours and Co. Aug. 24, 1931. 406,319.

VINYL RESINS and processes for producing the same.—Carbide and Carbon Chemicals Corporation. Sept. 25, 1931. 406,338.

SEPARATION OF SOLID IMPURITIES from molten metals.—Roessler and Hasslacher Chemical Co. Aug. 24, 1931. 406,339.

SULPHUR FROM GASES containing sulphur dioxide, production.—D. Tyrer and Imperial Chemical Industries, Ltd. Aug. 24, 1932. 406,343.

FORMIC ACID.—E. I. du Pont de Nemours and Co. Aug. 24, 1931. 406,344.

FORMIC ACID, production.—E. I. du Pont de Nemours and Co. Aug. 24, 1931. 406,345.

WAX-LIKE BODIES, production.—C. W. Richards and Imperial Chemical Industries, Ltd. Aug. 25, 1932. 406,355.

VULCANISATION of rubber.—I. G. Farbenindustrie. Sept. 2, 1931. 406,379.

AMINOALKYL SULPHONIC ACIDS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Sept. 2, 1932. 406,380.

BENZENE and its homologues, production.—C. C. Hall. Sept. 5, 1932. 406,385.

REMOVING INORGANIC SODIUM and/or chlorine compounds from milk.—Siemens and Halske Akt.-Ges. Oct. 16, 1931. 406,407.

DYE VATS.—E. Farrell. Nov. 11, 1932. 406,428.

POLYMERISATION PRODUCTS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Dec. 2, 1932. 406,443.

CHROMATES and protectives.—W. V. Gilbert. Dec. 6, 1932. 406,445.

RUBBER, treatment.—Naugatuck Chemical Co. June 4, 1932. 406,479.

PURIFYING GASES from sulphuretted hydrogen, method.—L. Mellersh-Jackson (Gastechnik Ges.). March 27, 1933. 406,495.

PIGMENTED PROTECTIVE COATINGS and products obtained by this process, process for manufacturing.—Weeks and Co. (London), Ltd. May 10, 1932. 406,513.

HORMONES, methods of obtaining.—President and Board of Trustees of St. Louis University. May 31, 1932. 406,531.

HYDROCARBONS of low boiling point by the heat treatment of distillates and extraction products of coal and the like with hydrogene under pressure, process for the manufacture. H.D. Elkington (Akt.-Ges. für Steinkohleverflüssigung und Steinkohleveredelung). June 19, 1933. 406,546.

NITROSYL CHLORIDE, ultilisation.—Kali-Forschungs-Anstalt Ges. Nov. 12, 1932. 406,553.

VOLATILIZING ZINC. New Jersey Zinc Co. May 12, 1933. 406,560.

CARBONACEOUS MATERIALS with hydrogenating gases, treatment.—I. G. Farbenindustrie. July 27, 1932. 406,561.

SOAP-LIKE MATERIALS, manufacture.—Deutsche Hydrierwerke Akt.-Ges. July 15, 1932. 406,565.

TITANIUM WHITE, processes for making. Metal and Thermit Corporation. September 9, 1932. 406,580.

NITROGENOUS FERTILISERS by the destructive distillation of organic material.—C. Matignon and P. Kachkaroff. Sept. 12, 1932. 406,602.

Complete Specifications Open to Public Inspection

FATTY ESTERS, process for manufacturing.—Proctor and Gamble Co. Aug. 22, 1932. 16874-6/33.

CELLULOSE ESTERS, process for the manufacture of products.—C. F. Boehringer and Soehne Ges. Aug. 20, 1932. 22815/33.

RUSTLESS IRON, processes for making.—Alloy Research Corporation. Aug. 24, 1932. 23335/33.

SYNTHETIC LACQUERS, preparation.—Soc. des Laques et Matières Plastiques. Aug. 23, 1932. 23342/33.

ORGANIC ETHERS, manufacture and use.—British Celanese, Ltd. Aug. 23, 1932. 23441/33.

MOTOR FUEL OILS.—E. I. du Pont de Nemours and Co. Aug. 24, 1932. 23557/33.

MORDANT DYESTUFFS, manufacture.—Durand and Huguenin Akt.-Ges. Aug. 24, 1932. 23564/33.

OXIDE COATINGS, methods of producing.—British Thomson-Houston Co., Ltd. Aug. 24, 1932. 23606/33.

VAT AND SULPHUR DYESTUFF preparations for textile printing.—I. G. Farbenindustrie. Aug. 26, 1932. 23693/33.

Applications for Patents

VACUUM DISTILLATION APPARATUS.—F. E. Bancroft. Feb. 28. 6502.

HIGH VACUUM DISTILLATION SYSTEMS.—F. E. Bancroft. Feb. 28. 6513.

DYEING VAT COLOURS on wool, etc.—G. Barker. Feb. 28. 6488.

GLYOXALINE DERIVATIVES, preparation.—Boot's Pure Drug Co., Ltd., B. Garforth and F. L. Pyman. Feb. 23. 6037.

HISTAMINE, preparation.—Boots Pure Drug Co., Ltd., B. Garforth, and F. L. Pyman. Feb. 23. 6038.

COMPOSITION OF MATTER.—British Glues and Chemicals, Ltd. Feb. 23. 5992.

VAT DYES, manufacture.—P. G. Carter, Imperial Chemical Industries, Ltd., and F. R. Thomson. Feb. 23. 6021.

ADSORBENT CUPRENE, production.—Sir R. H. Davis and L. A. Levy. Feb. 26. 6235.

HYDROGEN PEROXIDE, production.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler and L. Hess. Feb. 22. 5899.

DIBENZANTHRONE DYESTUFFS.—E. I. du Pont de Nemours and Co. Feb. 27. (United States, Feb. 27, '33.) 6373.

PRINTING with dyestuffs.—Durand and Huguenin Akt.-Ges. Feb. 27. (Germany, Feb. 27, '33.) 6347.

SULPHUR CONDENSER.—H. G. C. Fairweather, Guggenheim Bros., M. Guggenheim, S. Guggenheim, S. R. Guggenheim, S. W. Howland, E. A. C. Smith and M. G. B. Whelpley. Feb. 24. 6094.

ELEMENTAL SULPHUR, recovery.—H. G. C. Fairweather, Guggenheim Bros., M. Guggenheim, S. Guggenheim, S. R. Guggenheim, S. W. Howland, E. A. C. Smith and M. G. R. Whelpley.

PURIFYING MOTOR BENZOL from sulphur compounds.—Gas Light and Coke Co., W. V. Shannon and C. M. Warren. Feb. 22. 5853.

BITUMINOUS CONSTRUCTIONAL MATERIAL.—W. W. Groves and I. G. Farbenindustrie. Feb. 22. 5847.

HYDROCARBONS rich in carbon, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Feb. 22. (Oct. 12, '32.) 5903.

DYESTUFF PREPARATION, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Feb. 24. 6090.

CONDENSATION PRODUCTS from phenols and ketones, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Feb. 24. 6091.

MINERAL-OIL PRODUCT COMPOSITIONS.—I. G. Farbenindustrie and J. Y. Johnson. Feb. 24. 6092.

CONDENSATION PRODUCTS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Feb. 26. 6204.

HYDROCARBONS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. Feb. 28. 6485.

WATER-SOLUBLE DIAZOAMINO COMPOUNDS, ETC., manufacture.—I. G. Farbenindustrie. Feb. 22. (Germany, March 9, '33). 5908.

WATER-SOLUBLE DIAZOAMINO COMPOUNDS, ETC., manufacture.—I. G. Farbenindustrie. Feb. 22. (Germany, March 9, '33). 5909.

PYRENE DYESTUFFS, manufacture.—I. G. Farbenindustrie. Feb. 26. (Germany, Feb. 25, '33). 6195.

AMINOPYRENESULPHONIC ACIDS, manufacture.—I. G. Farbenindustrie. Feb. 26. (Germany, Feb. 25, '33). 6196.

ALKALI METAL NITRATE, manufacture.—I. G. Farbenindustrie. Feb. 26. (Germany, March 17, '33). 6206.

WATER-INSOLUBLE AZO DYESTUFFS, manufacture.—I. G. Farbenindustrie. Feb. 28. (Germany, Feb. 28, '33). 6508.

MONOAZO DYESTUFFS.—Imperial Chemical Industries, Ltd., A. H. Knight, H. A. Piggott, Feb. 23. 6019.

DYESTUFF INTERMEDIATES, manufacture.—Imperial Chemical Industries, Ltd., A. H. Knight, and H. A. Piggott. Feb. 23. 6020, 6022.

LEATHER FINISHES, manufacture.—Imperial Chemical Industries, Ltd., Feb. 27. 6392.

DISPERSING, ETC., AGENTS.—Imperial Chemical Industries, Ltd. and H. A. Piggott. Feb. 27. 6393.

FORMIC ACID, preparation.—R. Koepp and Co. Chemische Fabrik Akt.-Ges. Feb. 27. (Germany, April 18, '33.) 6363.

HYDROGEN PEROXIDE, production.—F. Krauss. Feb. 24. 6108.

HYDROXALKYL-HYDROXY DERIVATIVES of 2-phenylquinoline-4-carboxylic acid.—Schering-Kahlbaum Akt.-Ges. Feb. 22. (Germany, Feb 22. ,33). 5907.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

VERY few price changes have been announced during the week, and the chemical market has been moderately active. Acetic acid, acetone, formaldehyde, formic acid and oxalic acid have been in good demand and there has been a fair volume of business in ammonium chloride, caustic soda, salammoniac and sodium chlorate. Stocks of a number of wood distillation products are low, especially charcoal, and good business has been maintained. Moderate activity is reported from the coal tar products section and most prices are unchanged. Carbolic acid crystals are dearer, and there has been a reduction in the price of toluol. Business in pharmaceutical chemicals is confined principally to small orders for immediate delivery. Tartaric acid, aspirin, benzoic acd and bromdes are in moderate demand, and there is a little more interest in pyrogallic acid.

LONDON.—Prices continue firm; there are very few changes to report. A steady demand continues. The coal tar products market is unaltered from last week and prices continue firm and unchanged.

MANCHESTER.—Conditions on the Manchester chemical market during the past week have been moderately active, and although not a great volume of fresh contract buying has been going on sellers continue to report not unsatisfactory quantities going into consumption against existing commitments, with fair bookings of miscellaneous products for early delivery. The alkalies and certain of the potash materials are in moderate request, as are also some of the heavy acids. Although the outlook for the cotton trade is not too assured, fair quantities of textile chemicals are being taken by the dyeing and finishing establishments in the district. Actual price changes during the past week have been both few and of little individual importance, the general tone of the market remaining steady. Here and there among the by-products values seem to be firm, but this is by no means the case generally, the recent easiness of crude tar having its reactions in a number of sections of the market.

SCOTLAND.—Exceptional quietness has to be reported in the Scottish heavy chemical market.

General Chemicals

ACETONE.—LONDON: £65 to £68 per ton; SCOTLAND: £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON: Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND: Granulated commercial, £15 10s. per ton; powder, £28 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON: 9½d. per lb.; less 5%. MANCHESTER: 9½d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%, 1s. 5d. to 2s.

ACID, FORMIC.—LONDON: £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND: 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON: £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £48 to £50 ex store. MANCHESTER: £49 to £55 ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON: 11½d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s.

ALUM.—SCOTLAND: Lump potash, £8 10s. per ton ex store.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND: Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON: £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £23 ex wharf. MANCHESTER: White powdered Cornish, £21 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£7 to £8 10s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND: £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3½d. to 5d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON: £3 19s. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £27 per ton. SCOTLAND: 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON: White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £34 to £36; brown, £31 10s.

LEAD NITRATE.—£28 per ton. MANCHESTER: £28.

LEAD, RED.—SCOTLAND: £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND: £39 per ton, carriage paid. LONDON: £37 10s.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND: Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised Industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £39.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON: 5d. per lb. with usual discounts for contracts. SCOTLAND: 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99¾/100%, powder, £37. MANCHESTER: £38.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND: Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9d. per lb. SCOTLAND: B.P. crystals, 9d. MANCHESTER: Commercial, 8½d. to 8¾d., according to quantity in 2-cwt. drums; B.P., 9d. to 9¾d.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

RUPRON (MINERAL RUBBER).—£16 10s. per ton.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 15s. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 15s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. net.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRITE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£12 10s. per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5½d. ex store. MANCHESTER: 4¾d. to 5¾d.

SODIUM SILICATE.—140° Tw. Spot £8 per ton d/d station, returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £15 10s. to £15 15s. per ton f.o.b.

SULPHUR.—£10 15s. per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 3s. 11d. to 4s. 1d. per lb.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON AND SCOTLAND: £12 per ton.

ZINC SULPHIDE.—11d. to 1s. per lb.

Pharmaceutical and Fine Chemicals

The following changes in the prices of pharmaceutical and fine chemicals are announced:—

ACID, CITRIC.—9½d. per lb.

ACID, TARTARIC.—1s. 0½d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 9d. per lb.; crude, 60's, 2s. 1½d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 5d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d.; according to specification; refined, 1s. 11d. to 2s. 1d. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; dark, 97/99%, 1s. to 1s. 1d.; high boiling acid, 2s. 6d. to 3s.

ANTHRACENE OIL.—Strained, 4½d. per gal.

BENZOL.—At works, crude, 10d. to 10½d. per gal.; standard motor 1s. 5d. to 1s. 5½d.; 90%, 1s. 5½d. to 1s. 6d.; pure, 1s. 8½d. to 1s. 9d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.

CREOSOTE.—B.S.I. Specification standard, 3½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3¼d. f.o.r North; 4d. to 4½d. London. MANCHESTER: 3½d. to 4¼d. SCOTLAND: Specification oils, 4d.; washed oil, 4¼d. to 4¾d.; light, 4¼d.; heavy, 4¼d. to 4½d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 99/190%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked £10 per ton. Purified crystals, £9 15s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

PYRIDINE.—90/140, 6s. to 6s. 6d. per gal.

PITCH.—Medium, soft, £2 17s. 6d. to £3 per ton.

REFINED COAL TAR.—SCOTLAND: 4d. per gal.

TOLUOL.—90%, 2s. 6d. per gal.; pure, 2s. 9d.

XYLOL.—Commercial, 2s. 6d. to 2s. 7d. per gal.; pure, 2s. 9d. to 2s. 10d.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

p-CRESOL 34-5° C.—2s. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C. 9½d.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 5s. in casks, in 1-ton lots.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—4s. 3d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 to £10. Grey, £16 to £17. Liquor, brown, 30° Tw., 7d. to 9d. per gal. MANCHESTER: Brown, £12 10s.; grey, £17.

ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.

AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.

CHARCOAL.—£6 10s. to £10 per ton.

WOOD CREOSOTE.—Unrefined, 6d. to 9d. per gal.

WOOD NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £7 5s. per ton; export, nominal, £5 17s. 6d. f.o.b. U.K. ports in single bags.

CYANAMIDE.—£7 6s. per ton, carriage paid to railway station.

NITRITE OF SODA.—£7 18s. 6d. per ton nearest station.

NITRO-CHALK.—£7 5s. per ton nearest station.

CONCENTRATED COMPLETE FERTILISERS.—£10 15s. to £11 6s. per ton according to percentage of constituents.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton according to percentage of constituents.

Latest Oil Prices

LONDON, Mar. 7.—LINSEED OIL was quieter. Spot, £20 10s. (small quantities, 30s. extra); March, £18 17s. 6d.; March-April, £19; May-Aug., £19 5s.; Sept.-Dec., £19 15s., naked. RAPE OIL was slow. Crude, extracted, £24 10s.; technical, refined, £26, naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £13; refined common edible, £16 10s.; and deodorised £18, naked, ex mill (small lots 30s. extra). TURPENTINE was easier. American, spot, 49s. per cwt.

HULL.—LINSEED OIL, spot, quoted £19 7s. 6d. per ton; March, £18 15s.; April, £19; May-Aug., £19 7s. 6d.; Sept.-Dec., £19 17s. 6d.; naked. COTTON OIL, Egyptian, crude, spot, £13; edible, refined, spot, £15 5s.; technical, spot, £15 5s.; deodorised, £17 5s., naked. PALM KERNEL OIL, spot, £14 15s., naked. GROUNDNUT OIL extracted, spot, £18 10s.; deodorised £22 10s. RAPE OIL, extracted, spot, £23 10s.; deodorised, £25. SOYA OIL, extracted, spot, £16 10s.; deodorised, £19 10s. per ton. COD OIL, 22s. 6d. per cwt. CASTOR OIL, pharmaceutical, 36s.; first, 31s.; second, 28s. per cwt. TURPENTINE, American, spot, 51s. per cwt.

From Week to Week

TWO NAMAQUALAND PROSPECTORS have made rich finds of bismuth 70 miles from Springbok, South Africa.

MR. L. A. MUNRO is representing the interest of chemicals in the British Trade Mission to Poland. This mission is under the chairmanship of Sir Eugene Ramsden, M.P.

MR. E. O. GLOVER, a delegate director of Imperial Chemical Industries, Ltd., was returned unopposed for North Runcorn in the Cheshire County Council elections.

MR. SAMUEL PODMORE, of Greswolde Park Road, Acock's Green, Birmingham has died suddenly from a heart attack, aged 64. He was formerly chairman and co-founder with his son, Mr. Harold Podmore, of the Birmingham Chemical Co., Ltd.

THE LUDWIG MOND LECTURE, to be delivered in the chemistry theatre of Manchester University on Monday, March 19, will be given by the president of the Royal Society, Sir Frederick Gowland Hopkins. His subject is "Biological catalysis," and the Vice-Chancellor, Dr. W. H. Moberly, will preside.

MR. JAMES JAMIESON, of James Jamieson (Aberdeen), Ltd., Albert Oil and Chemical Works, has died, aged 73. He originally served in the chemical department of Richards, Ltd., of Broadford Works, starting on his own account in 1887 as a chemical broker and oil merchant.

TO MEET THE IMPROVED DEMAND for iron and steel the Cargo Fleet Iron Co., Ltd., are re-starting another blast furnace. The Consett Iron Co. are also putting an additional blast furnace into commission. When these two furnaces are in operation there will be 28 furnaces working on the North-East Coast, compared with 21 at the beginning of the year.

MR. JAMES A. FERRIER, manager of the Greenock branch of the British Oil and Cake Mills, who retired last December after 50 years' service, was presented by the firm with a silver salver last week at a dinner at the Central Hotel, Glasgow. He is a past president of the Scottish Seed Crushers' Association and an ex-convener of the Paint and Oil Section of Glasgow Chamber of Commerce.

MR. GEORGE FREDERICK BIGGS, well known in Manchester as a chartered accountant and as secretary to the Clayton Aniline Co., died last week. Mr. Biggs, who was 59, came to the Clayton Aniline Co. in 1915, when the company was engaged in the production of munitions. He was responsible for the establishment of the staff pension scheme, generally admitted to be one of the finest in the country.

THE IMPORT DUTIES ADVISORY COMMITTEE has received an application for the imposition of a minimum additional duty of 10 per cent. on aluminium oxide, hydrated. Any representations which interested parties may desire to make should be addressed in writing to the Secretary, Import Duties Advisory Committee, Caxton House (West Block), Tothill Street, Westminster, London, S.W.1, not later than March 29.

COMPARING THE IMPROVEMENT in the wool textile industry during the past year with the depression in the cotton industry, Mr. George Douglas, chairman of the Bradford Dyers' Association, Ltd., at the annual meeting in Bradford on February 28, pointed out that an examination of the figures for Japanese exports of cotton piece goods and of artificial and cotton woven goods provided an explanation. However efficient and modern the Association's plant might be, it could not be operated effectively against the low cost of Oriental labour combined with currency depreciation.

THE CHEMICAL AND ALLIED INDUSTRIES North-East Coast Dinner-Dance, will be held at the Royal Station Hotel, Newcastle-upon-Tyne, on Friday, March 16, at 7.30 p.m. Dr. R. E. Slade, of Billingham, and Mr. W. E. Mordecai, president of the Coke Oven Managers' Association will be the principal guests. Professor G. R. Clemo, chairman of the local section of the Institute of Chemistry, and of the Newcastle Section of the Society of Chemical Industry, will occupy the Chair. Tickets 10s. 6d. each, may be obtained from Mr. F. H. Walker, Newcastle Chemical Industry Club, 5 Lovaine Row, Newcastle-upon-Tyne, 2.

AMONG THE EXHIBITS inspected by the Prince of Wales at the British Industries Fair, Castle Bromwich, was that of the Birmingham Battery and Metal Co., Ltd. He was interested in the large copper and brass tubes flanking the sides of the stand and was informed that these were solid drawn up to 24 in. diameter. He next inspected large copper sheets manufactured by the company and was informed that the company had recently installed some bigger rolling plant capable of producing plates and sheets to yet larger dimensions. His Royal Highness made a complete inspection of the stand, asking several questions about the condenser tubes supplied to the Admiralty and mercantile marine. The entire exhibit and the greater part of the superstructure was built of the firm's own products.

THE BRITISH OXYGEN CO., LTD., are to extend their works at Polmadie, Glasgow.

MR. WILLIAM COWEN, M.Sc. (Manchester), has been appointed lecturer in Chemical Engineering in the Faculty of Technology in the University of Manchester.

SIR JAMES JEANS has been appointed president of the British Association for the current year, in succession to the late Sir William Hardy. He will deliver his presidential address when the Association meet in Aberdeen in September.

A CHEMICAL SOCIETY LECTURE, entitled "The Experimental Study of Some Gas Reactions," will be delivered by Professor M. W. Travers, in the Chemistry Lecture Theatre, The University, Liverpool, on Tuesday, March 13, at 7.45 p.m. Admission is free.

THE NOMINAL CAPITAL of the Ferolite Engineering Works, Ltd., 2 Kirtling Street, Battersea, S.W.8, has been increased by the addition of £9,500 beyond the registered capital of £10,500. The additional capital is divided into 11,000 6 per cent. preference and 8,000 ordinary shares of 10s.

THE BRITISH DRUG HOUSES, LTD., have issued a booklet containing an alphabetical list of all the more important preparations which are administered parenterally and, in addition, some useful notes on the therapeutic effects of the products and the condition in which the administration is indicated.

MR. ALBERT MARSDEN, one of the Glasgow representatives of the Vacuum Oil Co. has just completed 45 years' service with the company. Mr. Marsden holds the Vacuum Oil Company's long service record. He joined it in Liverpool in 1889, three years after it was established, and he one of the few survivors now in active service of the company's early days.

ALL THE OIL USED in the lubrication of the new Tees Bridge, which was opened officially by the Duke of York on February 28, has been supplied by the Vacuum Oil Co. The bridge is operated by electrical power from the local mains, but to safeguard it against any failure of the power supply, it has oil engine driven generators as a stand-by.

TWO NEW WORKS ARE TO BE ERECTED by Low Temperature Carbonisation, Ltd. Colonel W. A. Bristow, chairman of the company, who was in Glasgow last week, giving evidence before the Oil from Coal Committee of the Scottish National Development Council, stated that he was interested in the possibilities which Scotland might have to offer as the locus of new works, but declined to commit himself further.

APPLICATIONS FOR LICENCES under the Dyestuffs (Import Regulation) Act, 1920, during February totalled 770, of which 709 were from merchants or importers. To these should be added eight cases outstanding on January 31, making a total of 778. The Dyesteuffs Advisory Licensing Committee granted 766 licenses and referred nine applications to British makers of similar products, leaving three cases outstanding on February 28.

THE COUNCIL OF THE ROYAL SOCIETY have selected the following for election to the Fellowship of the Society:—Professor William Edward Curtis, professor of physics, Armstrong College, Newcastle-on-Tyne; Dr. Edmund Langley Hirst, senior lecturer in organic chemistry, Birmingham University; Professor Harold Raistrick, professor of biochemistry, London University; Professor Alexander Oliver Rankine, professor of physics, Imperial College of Science, and Professor Samuel Sugden, professor of physical chemistry, Birkbeck College.

MR. JOHN MORTIMER TALLANTYRE, of 12 Pelham Grove, Toxteth Park, Liverpool has died in his 73rd year. Mr. Tallantyre retired from business in 1926, when he resigned his directorship of Evans, Sons, Lescher and Webb, Ltd., after thirty-eight years' service, having joined Evans, Sons and Co. in 1888 as foreign representative responsible for the development of the firm's business in South and Central America, West Indies and Mexico. For many years he was a member of the Liverpool Chamber of Commerce, serving for a period as chairman of the Portuguese section.

LIEUT.-COLONEL JOHN COLVILLE, M.P., Secretary of the Department of Overseas Trade, announces that following upon recent preliminary conversations in Warsaw between representatives of the Polish Government and the Polish industries and Mr. Arthur Mullins, the Commissioner of the Overseas Trade Development Council, a United Kingdom Trade Mission has been formed to proceed to Poland. The Mission will have discussions with Polish industries and institutions with a view to ascertaining in what directions the United Kingdom's export trade to Poland can be increased. The Mission will be under the chairmanship of Sir Eugene Ramsden, O.B.E., M.P., and will be composed of representatives of United Kingdom industries. Mr. L. A. Munro, nominated by the Association of British Chemical Manufacturers, will represent the chemical industry.

Forthcoming Events

Mar. 12.—Ceramic Society. "Fuel Saving in the Ceramic Industry." Dr. Felix Singer. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Mar. 12.—Society of Chemical Industry and Institute of Chemistry (Edinburgh Sections). "Lubrication." Dr. A. E. Dunstan. 8 p.m. North British Station Hotel, Edinburgh. Annual general meeting of Society of Chemical Industry (Edinburgh Section). 7.30 p.m.

Mar. 12.—Institution of the Rubber Industry (London Section). "Industrial Development and Future of the Rubber Industry. Dr. T. J. Drakeley. 7.30 p.m. First Avenue Hotel, High Holborn, London.

Mar. 12.—Institute of Metals (Scottish Section). Annual general meeting. 7.30 p.m. 39 Elmbank Crescent, Glasgow.

Mar. 13.—Society of Chemical Industry (Food Group). Members' meeting. 7.30 p.m. Burlington House, London.

Mar. 13.—The Institute of the Plastics Industry (London Section). "Some of the Uses of Laminated Materials." A. W. Sherwood. Windsor Castle Hotel, Victoria, London.

Mar. 13.—Institution of Petroleum Technologists. 5.30 p.m. Annual General Meeting. John Street, Adelphi, London.

Mar. 13.—Institute of Metals (Swansea Section). Discussion on Rolling, opened by Professor L. Taverner. 6.15 p.m. Y.M.C.A., Swansea.

Mar. 13.—Institute of Metals (N.E. Coast Section). Annual general meeting. Chairman's Address. 7.30 p.m. Armstrong College, Newcastle-on-Tyne.

Mar. 13.—Pharmaceutical Society of Great Britain. "The British Pharmaceutical Codex: Some Notes on its Revision." C.E. Corfield. 8.30 p.m.

Mar. 14.—Manchester Metallurgical Society. "The Platinum Metals." A. R. Raper. 7 p.m. Engineers' Club, Albert Square, Manchester.

Mar. 14.—The British Wood Preserving Association. "Timber Buildings." I. J. O'Hea. 6 p.m. 29 Lincoln's Inn Fields, London.

Mar. 15.—The Chemical Society. Ordinary scientific meeting. 8 p.m. Burlington House, London.

Mar. 15.—The Chemical Society (Sheffield). "Some Stereochemical Problems." Dr. W. H. Mills. 7.30 p.m. University, Sheffield.

Mar. 15.—Society of Dyers and Colourists (West Riding Section). "The Romance of Photosynthesis, its Achievement and Explanation." Professor E. C. C. Daly.

Mar. 15.—Institute of Metals (London Section). "Spectroscopic and Microchemical Analysis of Metals and Alloys." G. Barr and Miss Hadfield. 7.30 p.m. 83 Pall Mall, London.

Mar. 15.—Institute of Chemistry (Manchester). "The Relation of the Works Chemist to Staff and Workers." A. W. Knapp. 7 p.m. Manchester.

Mar. 16.—Chemical and Allied Industries North East Coast Dinner-Dance. 7.30 p.m. Royal Station Hotel, Newcastle-on-Tyne.

Mar. 16.—West Cumberland Society of Chemists and Engineers. "Works Maintenance." A. E. Leek. 7 p.m. Workington.

Mar. 16.—Royal School of Mines Union. Conversazione. 8 p.m. Royal School of Mines, Prince Consort Road, South Kensington, London.

Mar. 16.—The Physical Society. Annual general meeting. 5 p.m. Imperial College of Science and Technology, South Kensington, London.

Mar. 16.—Society of Dyers and Colourists (Manchester Section). "Some Observations on Some of the New Detergent and Finishing Agents." R. J. Hannay.

Mar. 16.—Society of Dyers and Colourists (Bradford Junior Branch). "Colour in Relation to Constitution." F. G. Anderson.

Mar. 16.—The Institute of the Plastics Industry (Midlands Section). "Laminated Sheet." E. R. R. Bray. 7.30 p.m. Imperial Hotel, Temple Street, Birmingham.

Mar. 16.—Society of Chemical Industry (South Wales Section). Annual general meeting. 6.45 p.m. Thomas' Cafe, High Street, Swansea.

Mar. 16.—Society of Chemical Industry (Liverpool Section). "Salt Deposits." Professor H. H. Read. Annual meeting of Section. 6 p.m. University, Liverpool.

Company News

Boots Pure Drug Co.—The usual quarterly dividend of 6 per cent., less tax, is announced, payable on March 31.

Reckitt and Sons, Ltd.—A final dividend of 6¼ per cent. and a bonus of 1¼ per cent. is announced on the ordinary shares, making 22½ per cent. for the year 1933, the same as for the year 1932.

British Portland Cement Manufacturers, Ltd.—A dividend of 15 per cent. is announced on the ordinary shares. After providing £54,123 for debenture sinking funds and £205,000 for depreciation, the carry-forward is raised from £200,522 to £204,778.

Yorkshire Indigo, Scarlet and Colour Dyers.—The report for the year 1933 shows a profit, after depreciation, etc., of £2,542, against a loss in the previous year of £3,828. Debenture interest takes £4,514 and the debit brought forward was £4,444, which leaves a deficiency to be carried forward of £6,416.

Associated Portland Cement Manufacturers, Ltd.—An ordinary dividend in respect of 1933 is announced at the rate of 7 per cent. After providing £58,484 for debenture stock sinking funds and £387,150 for depreciation, the carry-forward is raised from £166,728 to £170,580.

Joseph Nathan & Co.—The report for the year to September 30 last shows that reading profit is up from £36,701 to £73,167. After writing off £16,500 from subsidiary and associated companies, the net balance is £39,522. After paying one year's dividend on the "A" 7 per cent. preference shares, the carry-forward is £23,819. The annual meeting will be held at 56 Osnaburgh Street, London, N.W.1, on March 28, at 12 noon.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Canada.—A firm in Montreal engaged in the manufacture and distribution of various cleaning compounds and disinfectants, desires to obtain an United Kingdom agency for the sale of sulphonated oils (castor and olive), in the Province of Quebec only. (Ref. No. 262.)

Finland.—The Commercial Secretary to H.M. Legation at Helsingfors reports that the Finnish State Railways are calling for tenders for the supply of asphalt, mastix, about 20,000 kilos; asphalt, pitch, about 10,000 kilos; "Goudron" (mineral tar), about 7,000 kilos; resin, about 5,000 kilos; cotton waste, about 70,000 kilos; fireclay (in sacks), about 65,000 kilos. Tenders must be submitted to Offices of the Finnish State Railways, Helsingfors, not later than March 26. (Ref. B.7773.)

Roumania.—A firm in Bucharest is desirous of representing United Kingdom manufacturers and exporters of textile dyes and chemicals. (Ref. No. 281.)

Turkey (Istanbul).—A commission agent is desirous of representing United Kingdom manufacturers of industrial chemicals and aniline dyes. (Ref. No. 284.)

Mexico.—A firm in Mexico City is desirous of obtaining the representation of United Kingdom manufacturers of colours and dyes for skins, furs, etc. (Ref. No. 285.)

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

BUSINESS OPPORTUNITIES

(1s. per line; minimum charge 3s.)

SPLENDID Opportunity for Chemist at Orpington Garden Estate. Modern Shop; write or call. Shops also available on Godstone Road, Whyteleaf, Surrey; particulars on request. E. O'SULLIVAN (KENLEY), LTD., Arterial Road, St. Mary Cray, Kent.

EDUCATIONAL

(1s. per line; minimum charge 3s.)

SALTERS' INSTITUTE OF INDUSTRIAL CHEMISTRY.

FELLOWSHIPS.

Applications are invited for a limited number of Fellowships available for chemists of post-graduate standing. The object of the Fellowships is to afford additional and special training at home or abroad preparatory to a career in industrial chemistry. The course to be followed will in each case be decided by the Director in consultation with the Fellow. The value of a Fellowship is normally from £250 to £300, but the Institute is prepared to consider applications which might justify the award of Fellowships of higher value.

Applications should be received by the Director of the Institute, Salters' Hall, St. Swithin's Lane, London, E.C.4, on or before

1st MAY, 1934.

Further particulars and forms of application may be had on request.

ARTHUR SMITHELLS,
Director.

SALTERS' INSTITUTE OF INDUSTRIAL CHEMISTRY.

GRANTS-IN-AID.

The Committee will in July allocate a limited number of Grants-in-Aid to young men and women employed in chemical works in, or near, London, who desire to extend their education for a career in chemical industry. Applicants must not be under 17 years of age. Applications, with particulars of age, nature of employment and the manner in which the grant would be used, and giving the name of some person to whom reference may be made, should be sent as soon as possible, and in any case not later than 1st May, 1934, to the Director of the Institute, Salters' Hall, St. Swithin's Lane, London, E.C.4.

ARTHUR SMITHELLS,
Director.

FOR SALE

(1s. per line; minimum charge 3s. Sixpence extra is charged when replies are addressed to Box Numbers.)

BROUGH'S Patent Indestructible Drums and Kegs, also Plain Welded, Double-seamed or Corrugated Drums and Kegs, of every description, from 1 to 80 gallon.—4 Upper Parliament Street, Liverpool. Telephone: Royal 2685. Telegrams: Superdrum, Liverpool.

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill Jones Pop., London." Telephone: 3633 East.

HYDRAULIC PRESSES AND PUMPS. Large stock in London. Price quoted for adapting and erecting.—THOMPSON AND SON, Maria Street, Millwall.

MIXERS by Werner and other makers, jacketed pans, disintegrators, grinders, good stock.—C. F. DAVIS, LTD., Hatcham Road, Old Kent Road, London, S.E.15.

TO DYERS and Artificial Silk Manufacturers.—Special Yarn Poles for Cotton, Wool and Silk Dyers, also Stoves Poles, Dye Boxes, Bobbins, Rollers, Bogies, Yarn Barrows, etc. Special Lancewood Poles and Canes, superfine finish for Mercerisers. Prices on application. CRAWFORD'S TURNING MILLS, Paisley, Scotland.

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EDWARD RUSHTON, SON AND KENYON (Established 1855).
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York House, 12 York Street, Manchester.
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